



**US Army Corps
of Engineers**
Waterways Experiment
Station

AD-A274 559



Technical Report HL-33-3
November 1993

②

Demonstration Erosion Control Project Monitoring Program

Fiscal Year 1992 Report

Volume V: Appendix D Stream Gauging Data Report

*by David D. Abraham, Steve Sutton
Hydraulics Laboratory*



Approved For Public Release; Distribution Is Unlimited

93-31376



93 12 27 136

Prepared for U.S. Army Engineer District, Vicksburg

The contents of this report are not to be used for advertising, publication, or promotional purposes. Citation of trade names does not constitute an official endorsement or approval of the use of such commercial products.



PRINTED ON RECYCLED PAPER

Demonstration Erosion Control Project Monitoring Program

Fiscal Year 1992 Report

Volume V: Appendix D Stream Gauging Data Report

by David D. Abraham, Steve Sutton
Hydraulics Laboratory

U.S. Army Corps of Engineers
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199

Accession For	
NTIS	CRA&I <input checked="" type="checkbox"/>
DTIC	TAB <input type="checkbox"/>
Unannounced <input type="checkbox"/>	
Justification	
By	
Distribution /	
Availability Codes	
Dist	Avail and/or Special
A-1	

Final report

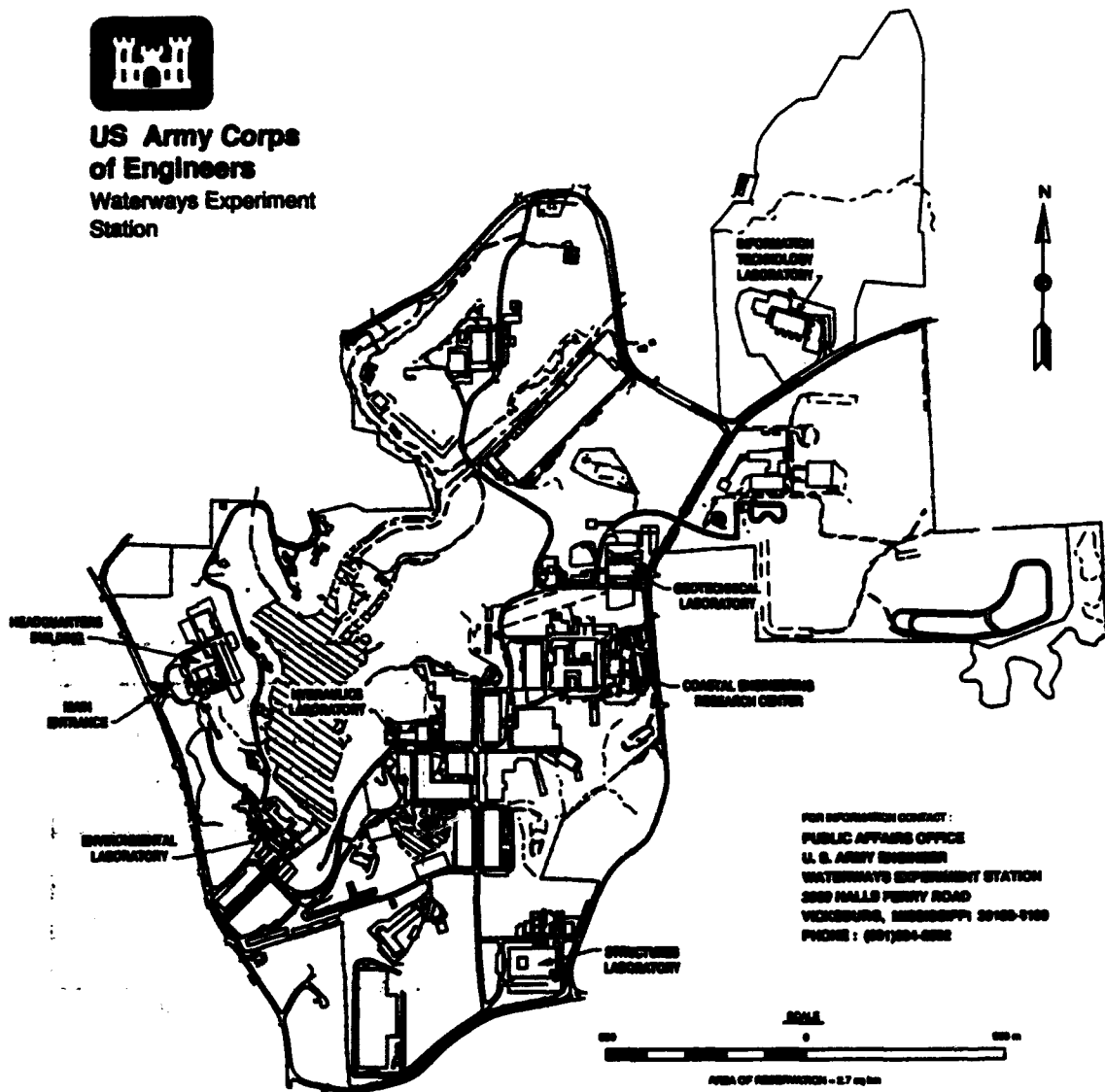
Approved for public release; distribution is unlimited

DTIC QUALITY INSPECTED 8

Prepared for U.S. Army Engineer District, Vicksburg
3550 I-20 Frontage Road
Vicksburg, MS 39180-5191



**US Army Corps
of Engineers
Waterways Experiment
Station**



FOR INFORMATION CONTACT :
PUBLIC AFFAIRS OFFICE
U. S. ARMY ENGINEER
WATERWAYS EXPERIMENT STATION
3800 HALLS FERRY ROAD
VICKSBURG, MISSISSIPPI 39180-9100
PHONE : (601)284-6882

Waterways Experiment Station Cataloging-in-Publication Data

Abraham, David D.

Demonstration Erosion Control Project Monitoring Program : fiscal year 1992 report. Volume V: Appendix D, Stream gauging data report / by David D. Abraham, Steve Sutton ; prepared for U.S. Army Engineer District, Vicksburg.

60 p. : ill. ; 28 cm. — (Technical report ; HL-93-3 v. 5)

1. Stream measurements — Mississippi. 2. Stream-gaging stations. 3. Watershed management — Mississippi. 4. Hydrology — Mississippi. I. Sutton, Steve. II. United States. Army. Corps of Engineers. Vicksburg District. III. U.S. Army Engineer Waterways Experiment Station. IV. Title. V. Title: Stream gauging data report. VI. Series: Technical report (U.S. Army Engineer Waterways Experiment Station) ; HL-93-3 v. 5.

TA7 W34 no.HL-93-3 v.5

Appendix D

Stream Gauging Data Report

Introduction

This appendix contains the following stage gauge information:

- a. Location maps for selected stage gauging stations.
- b. Stage data plots from the selected stations.
- c. Stage data collection instrumentation specifications.

Location Maps

Location maps for the selected gages are given as follow:

Gauge	Watershed	Plate
061120 061130	Hickahale-Senatobia	D1
061920 061930		D2 D2
021611 021623 021631 021633	Batupen Bogue	D3
062020 062030	Long	D4
071330 071340	Hotophia	D5
050620	Coldwater	D6
010320	Abiaca	D7
091520	Otucalofa	D8

Stage Data Plots from Selected Gauges

Stage data collected at the 16 gauges listed in the following tabulation are presented in Plates D9-D49. (All gauge data presented are referenced to the National Geodetic Vertical Datum (NGVD).) For each gauge presented, the period of record is from the time of installation to 30 June 1992. The remaining gauges are not presented here because the NGVD datum was not established in time for the Fiscal Year 1992 reporting period. The complete set of data is available from the U.S. Army Engineer Waterways Experiment Station in HECDSS format.

Watershed	Creek	Gauge	Plate
Hickahale-Senatobia	Hickahale	061120	D 9-D11
		061130	D12-D14
	James Wolf	061920	D15-D17
		061930	D18-D20
Batupen-Bogue	Worham	021811	D21,D22
		021823	D23-D25
		021831	D26-D28
		021833	D29-D31
Long	Long	082020	D32-D34
		082030	D35-D37
Hotophia	Hotophia	071330	D38-D40
		071340	D41-D43
Coldwater	Lick	060820	D44,D45
Abiaca	Abiaca	010320	D46,D47
Otaucalala	Sarter	091520	D48,D49

Instrument Specifications

Specifications for the instrumentation used in data collection are given as follow:

Instrument	Table
Lundahl DCU-10 Ultrasonic Sensor	D1
Sutron 8200 Data Logger	D2
Stevens Submersible Depth Transmitter II	D3
Leopold and Stevens Model 420 Level Logger	D4
Data Card for Level Logger	D5

Table D1
Lundahl DCU-10 Ultrasonic Sensor Specifications

supply voltage	11-30 VDC
total current draw	175 mA (67 mA without display or LEDs on)
transducer operating range	
electrostatic	0.3-70 ft.
ceramic environmental	1.5-70 ft.
outputs	4-20 mA 1-5 volts with external resistor (249Ω)
digital outputs	dual NPN PNP outputs for trip point/gating function
resolution	0.01 ft. over full range
accuracy using temperature	electrostatic: $\pm 0.1\%$ of range with no gradient ceramic: $\pm 0.2\%$ of range with no gradient

Table D2
Sutron 8200 Data Logger Specifications

Processor	NEC V25	Operates at a clock speed of 5 MHz
Memory	RAM EPROM EEPROM	Up to 6 (32k by 8) chips - data storage 2 (32k or 64k by 8) chips - operating system 1 (2k by 8) chip - system setup, password
Battery back-up	Lithium Battery for long storage life Backup life	2 years minimum (actual life will depend upon environment). 1 year minimum.
Real-time clock	Accuracy	1 minute per month
Watch-dog timer	Provides system reset upon microprocessor failure	
Sample intervals	1 second to 24 hours in 1 second increments	
Data Retrieval	Portable computer RAM Pack modules RS-232 Port	Data extracted via the serial port Retrieval time 15 seconds maximum RAM Pack is connected through terminal on front panel Data may be extracted into any PC through the serial port
Visual Display	16-character LED display	
Serial Sensor	Connection may be made through the RS-232 jack on the front panel	Possible to program unit through serial port even when it is used for sensor input.
SDI-12	The 8200 supports the USGS SDI-12 interface through a second serial port on the front panel.	
Communications	GOES Satellite, LOS Radio, and voice-synthesized telephone options available.	See separate data sheets for specifications.
Shaft Encoders (2)	Switch closure with quadrature inputs	3-wire interface
Tipping bucket rain gage (1)	Input Levels	Switch closure 0 to 5 volts
Counter Inputs (5 max)	Counter Resolution Maximum input frequency	12 bits 1 KHz
Analog Inputs	4 standard Resolution Accuracy Input Range DC excitation output Conversion period Power consumption of A/D	Up to 16 available as option, external multiplexer extends number even higher 12 bits + or - 0.25% of full scale 0 to 5v standard 0 to 5v differential with programmable gain available with expanded input option + 5 volts, +12 volts 16 milliseconds 30 milliwatts active
Pressure transducer (1)	DC Excitation Differential input range	+/- 5 volts interface (1) -5 to +100 mv
Power Supply	Internal Battery Operation with no charging Operation with charging Maximum Current Quiescent current Maximum average current	6.5 amp hours at 12 volts 90 days at a shaft encoder sample rate of once per 15 min External AC or solar power input (internally regulated) 750 mA (with full display) 500 microA 2 mA at a shaft encoder sample rate of once per 15 min

Table D3
Stevens Submersible Depth Transmitter II Specifications

Power:	12-35 VDC
Output:	4-20 mA current signal, linearly corresponding to range
Operating temperature:	33 to 122° F. +1 to 50° C, calibrated for fresh water at 72° F (22° C). NOTE: SDT-II SHOULD NOT BE SUBJECTED TO FREEZING WATER CONDI- TIONS.
Media:	Water, contaminated with any media compatible with 316 stainless steel, PVC, nylon, and polyurethane.
Accuracy:	<u>Linearity:</u> 1% of full scale or better <u>Zero:</u> 4.0 \pm 0.2 mA at 22° C <u>Span:</u> 20.0 \pm 0.5 mA at 22° C <u>Thermal zero drift typical:</u> 0.1% of span per degree C

Table D4

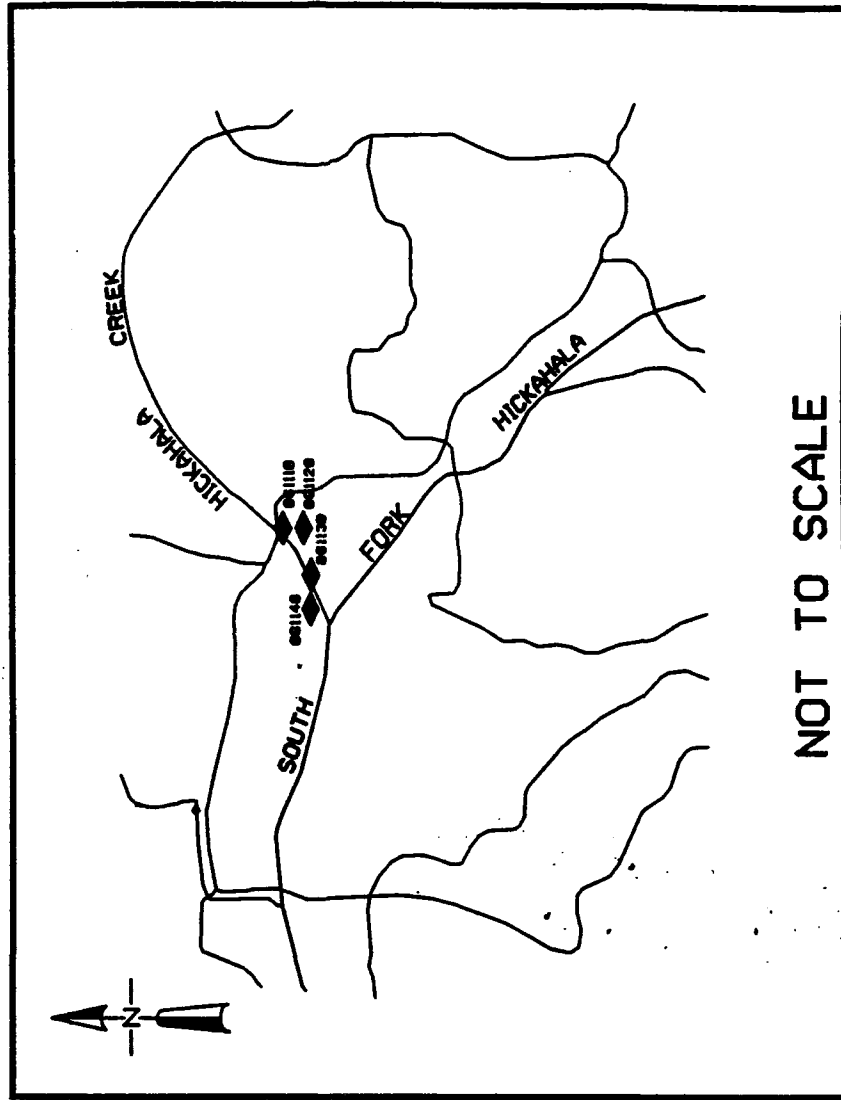
Leopold and Stevens Model 420 Level Logger Specifications

Serial Channel:	Serial ASCII through RS-232 interface at a minimum ± 5 volt levels. Supports both hardware and software (XON/XOFF) handshaking. Provides telemetry of current level, total memory readout of the Data Card, and Data Card erasure.
Format (fixed):	7 data bits, 1 stop bit, even parity
Baud rate (selectable):	300, 1200, 2400, or 9600
Power:	10-17 VDC
Current:	Less than 1 mA DC, during normal recording. Data Logger in "Data Logger" mode enters a low current "sleep" mode when no activity is required.

Table D5
Data Card for Level Logger Specifications

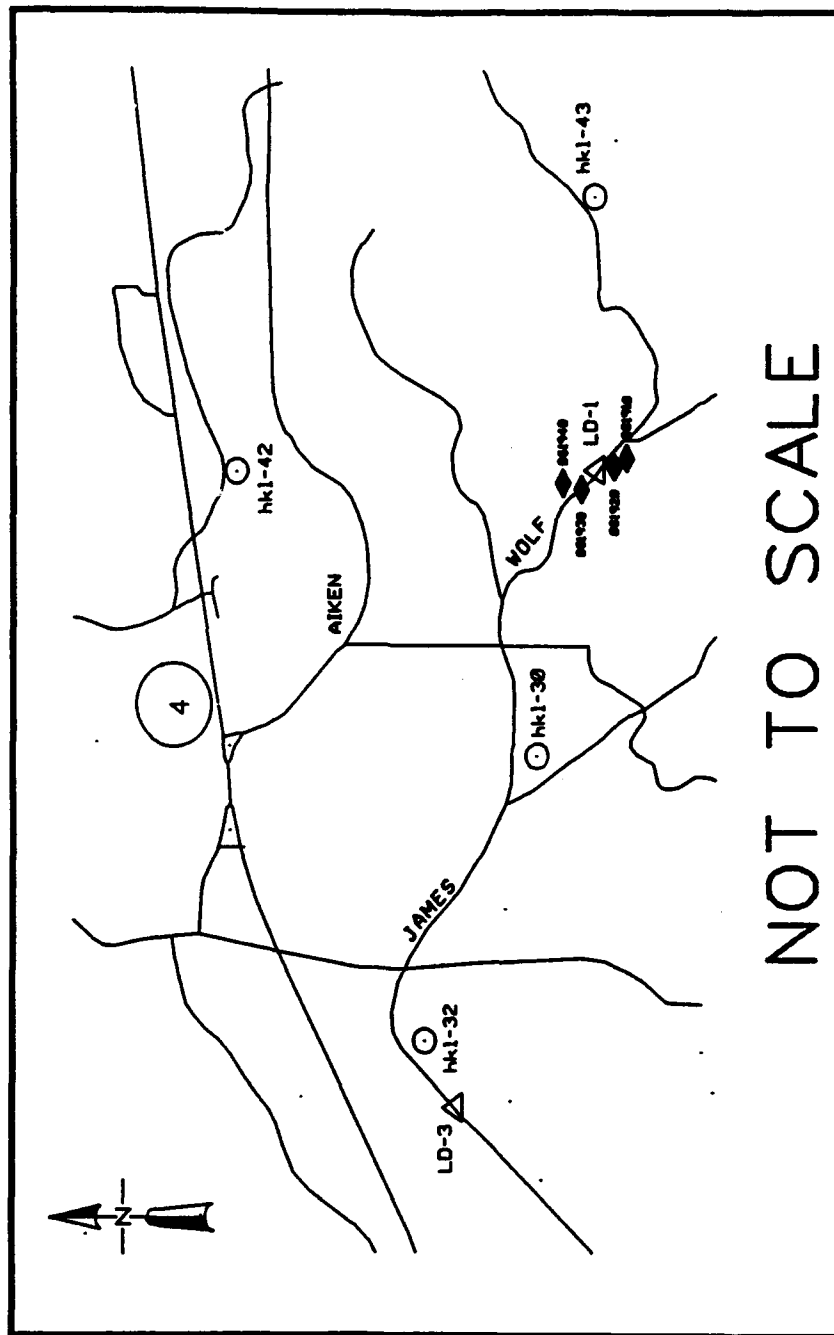
Capacity:	64K bytes. Sufficient storage for approximately 30,000 readings, non-circulating.
Power:	CR2016 type battery, 3V Lithium (NEDA #5000L), readily available in local stores.
Battery replacement interval:	6 months at 25° C operating temperature. 3 months at 45° C operating temperature.
Operating temperature:	-20 to +50° C
Relative humidity:	0-95%, non-condensing
Size:	3-1/2 x 2-1/4 x 1/8 inches (8.75 x 5.75 x 0.5 cm)
Recording intervals:	1 second; 1, 5, 6, 10, 15, and 30 minutes; 1, 2, and 4 hours

HICKAHALA-SENATOBIA WATERSHED HICKAHALA CREEK

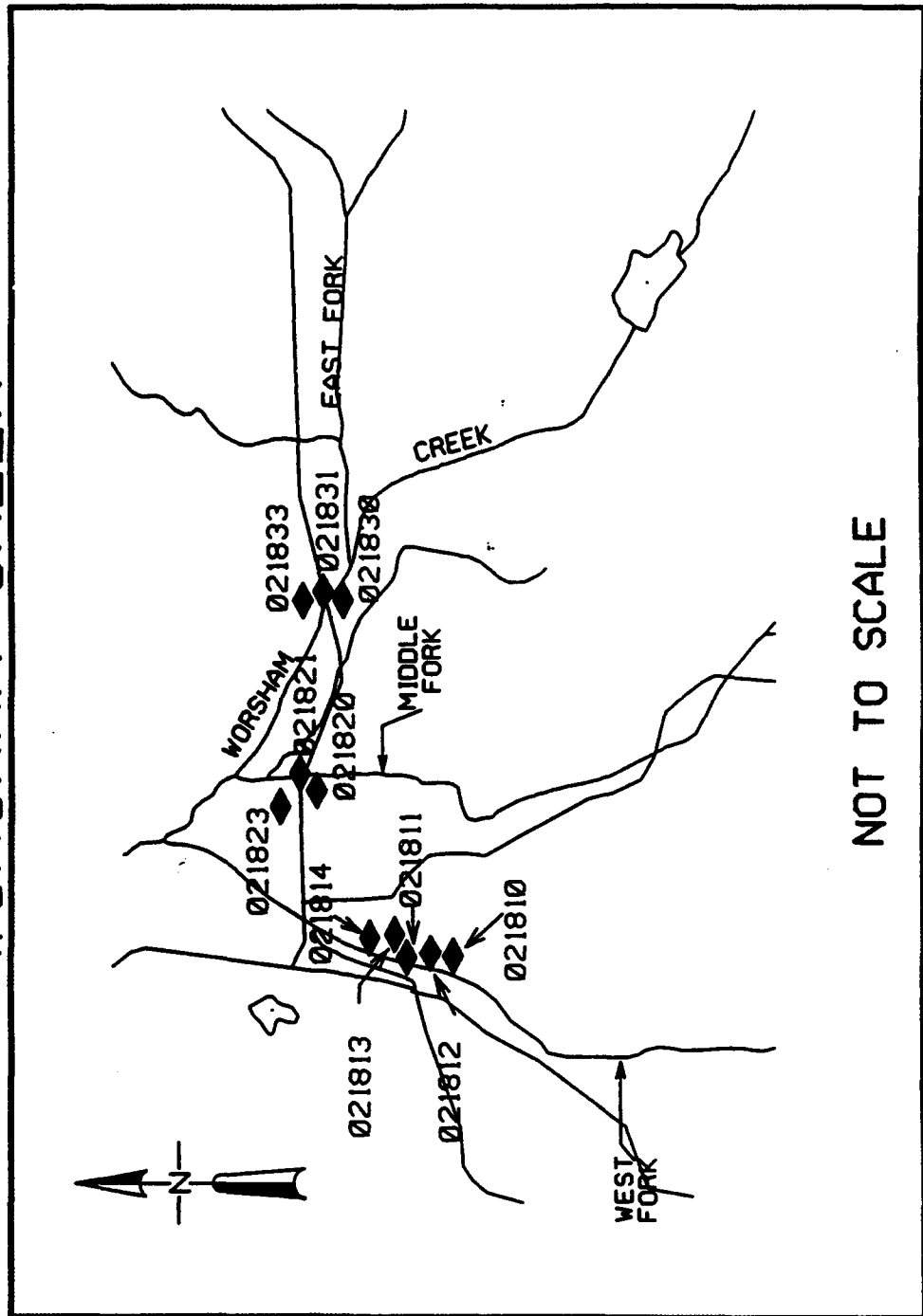


HICKAHALA-SENATOBIA WATERSHED

JAMES WOLF CREEK



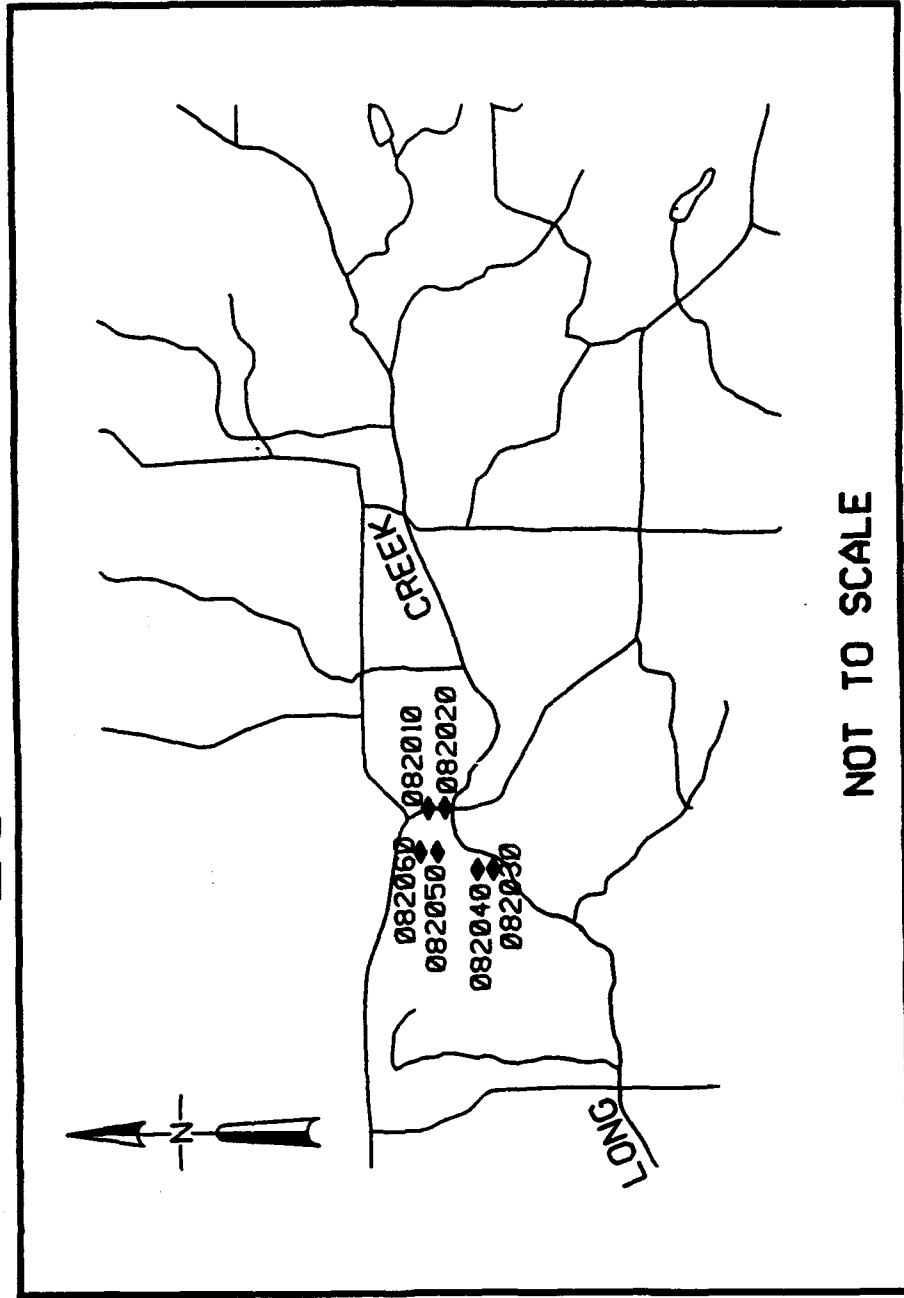
BATUPAN BOGUE WATERSHED WORSHAM CREEK



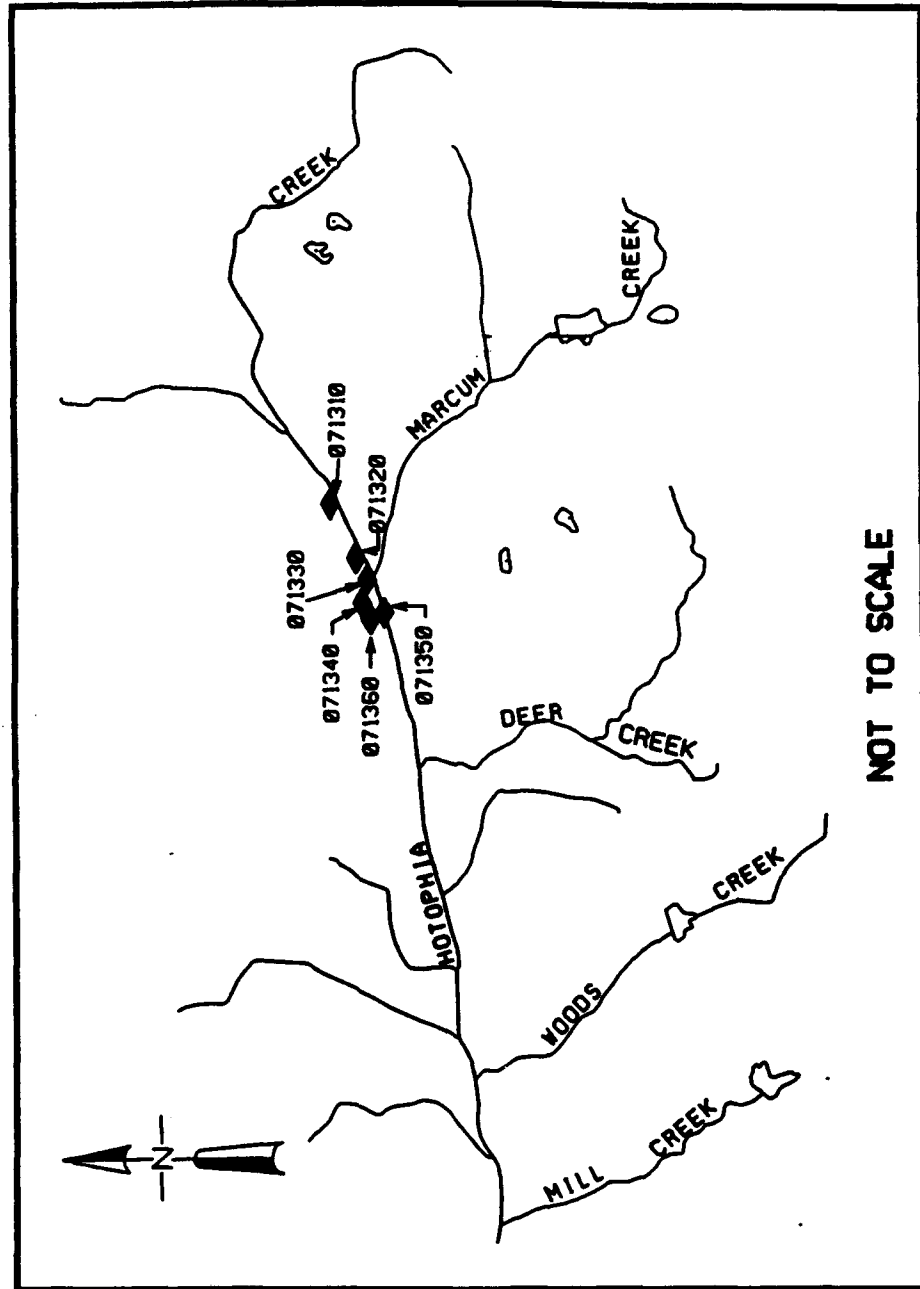
NOT TO SCALE

LONG CREEK WATERSHED

LONG CREEK

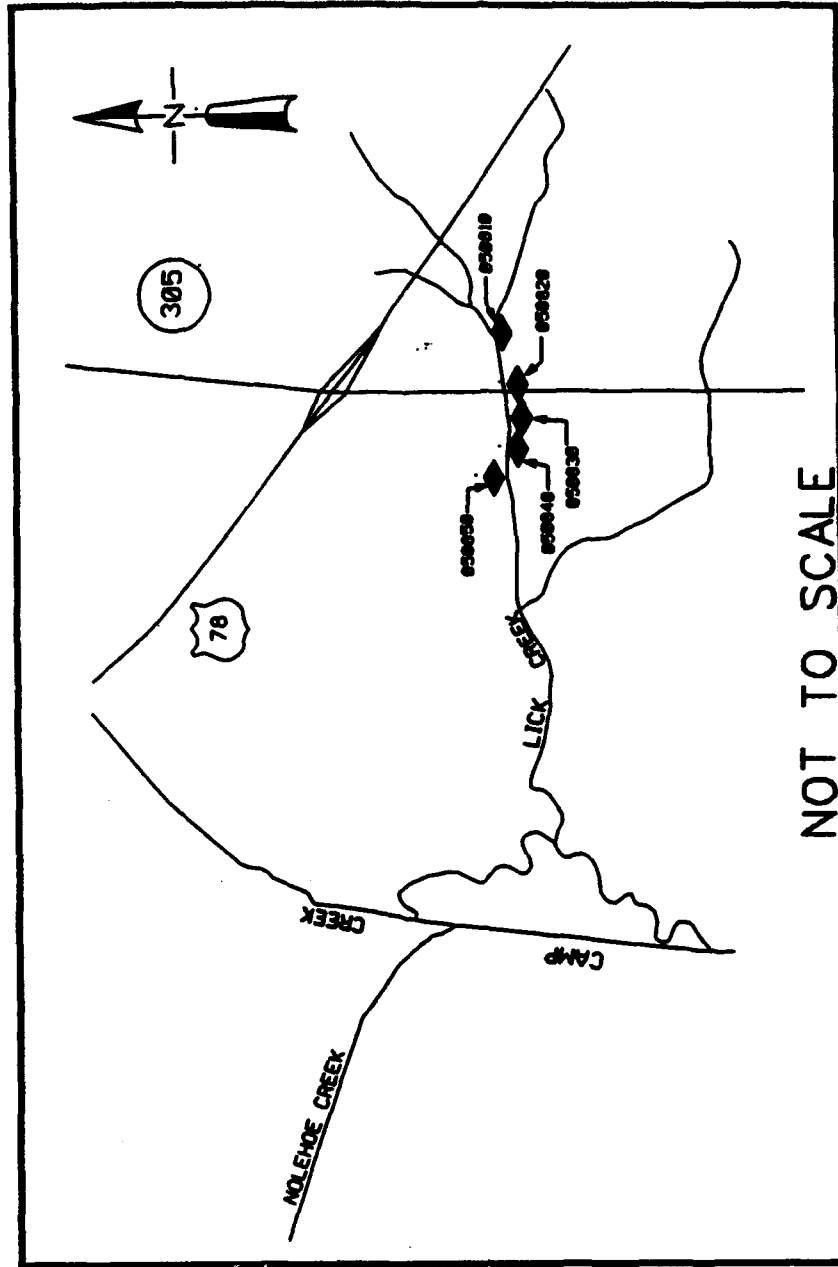


HOTOPHIA CREEK WATERSHED HOTOPHIA CREEK

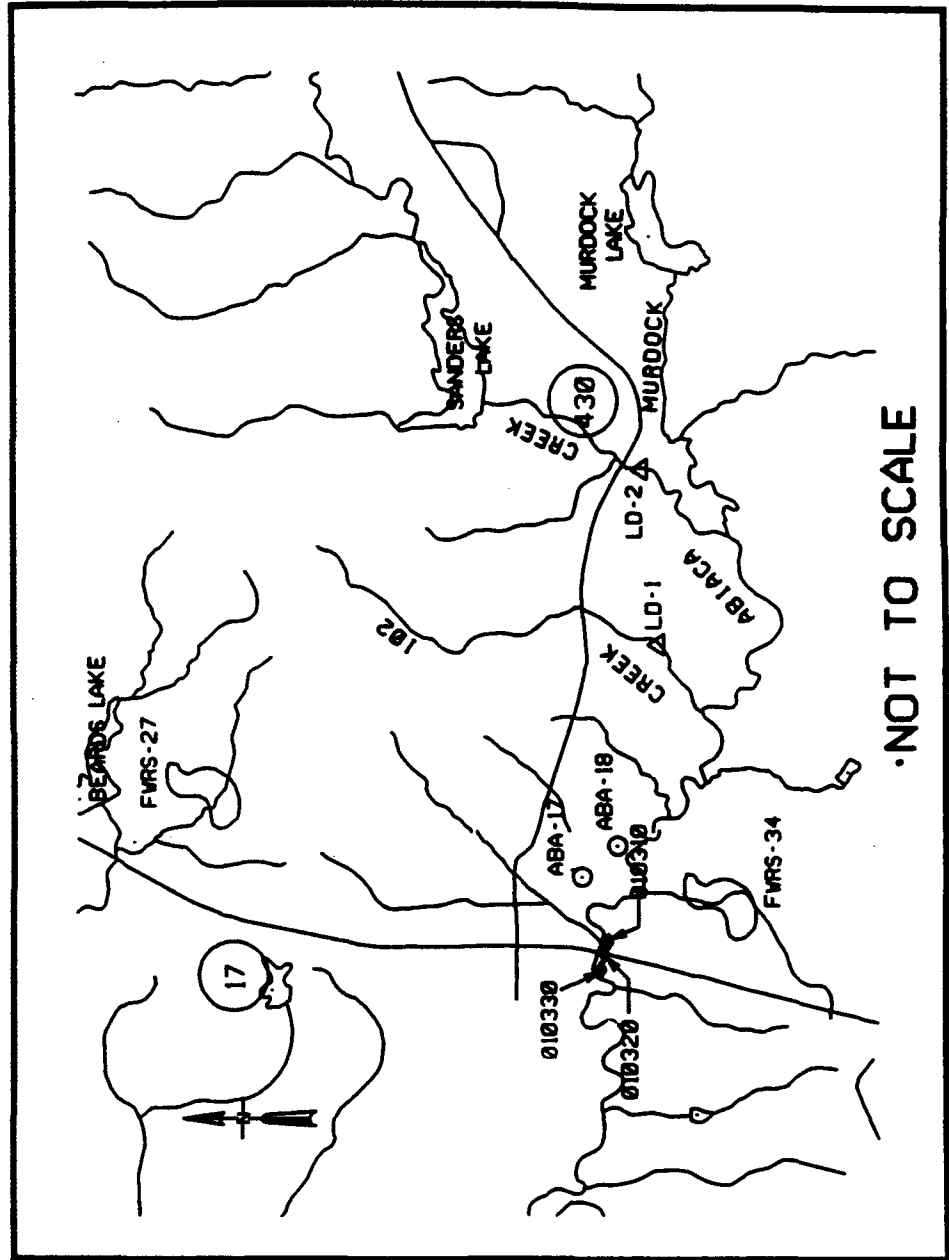


NOT TO SCALE

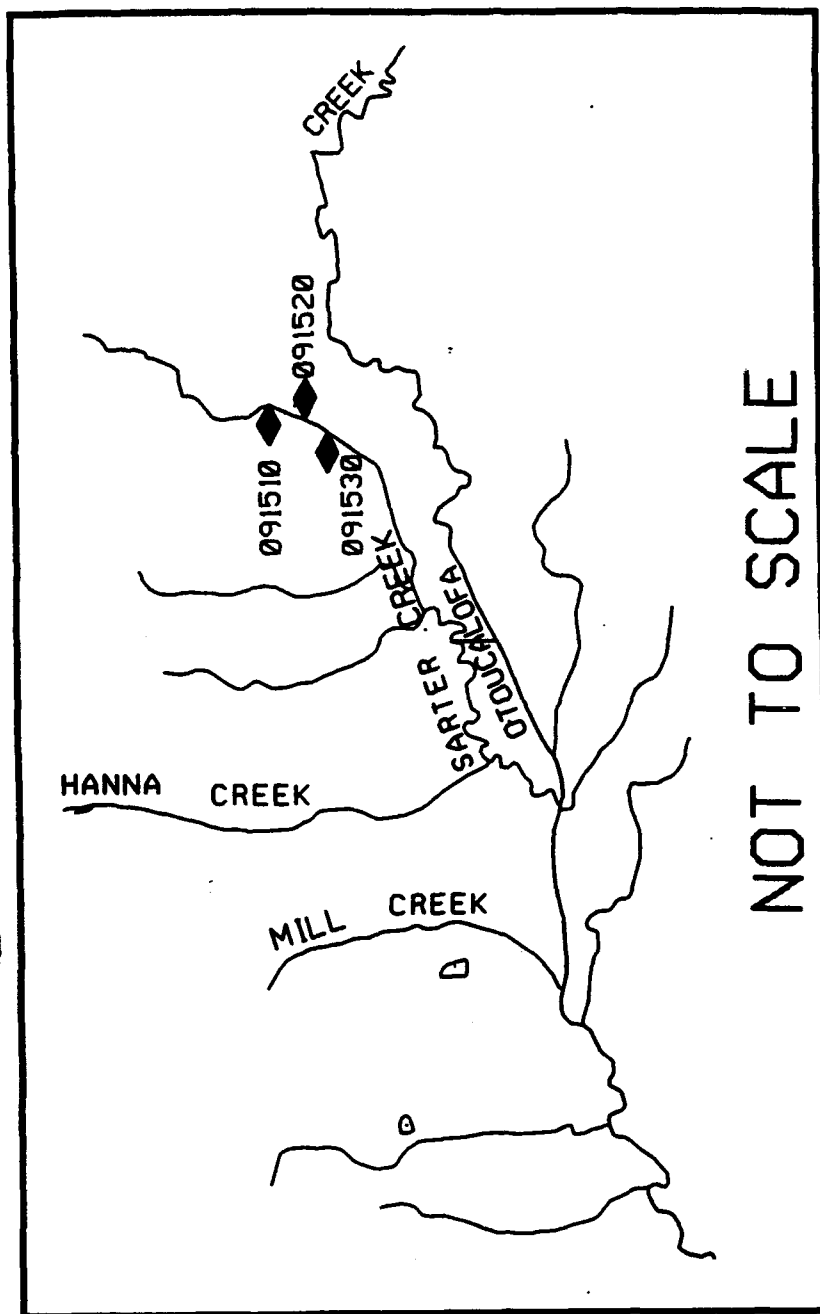
COLDWATER RIVER WATERSHED LICK CREEK



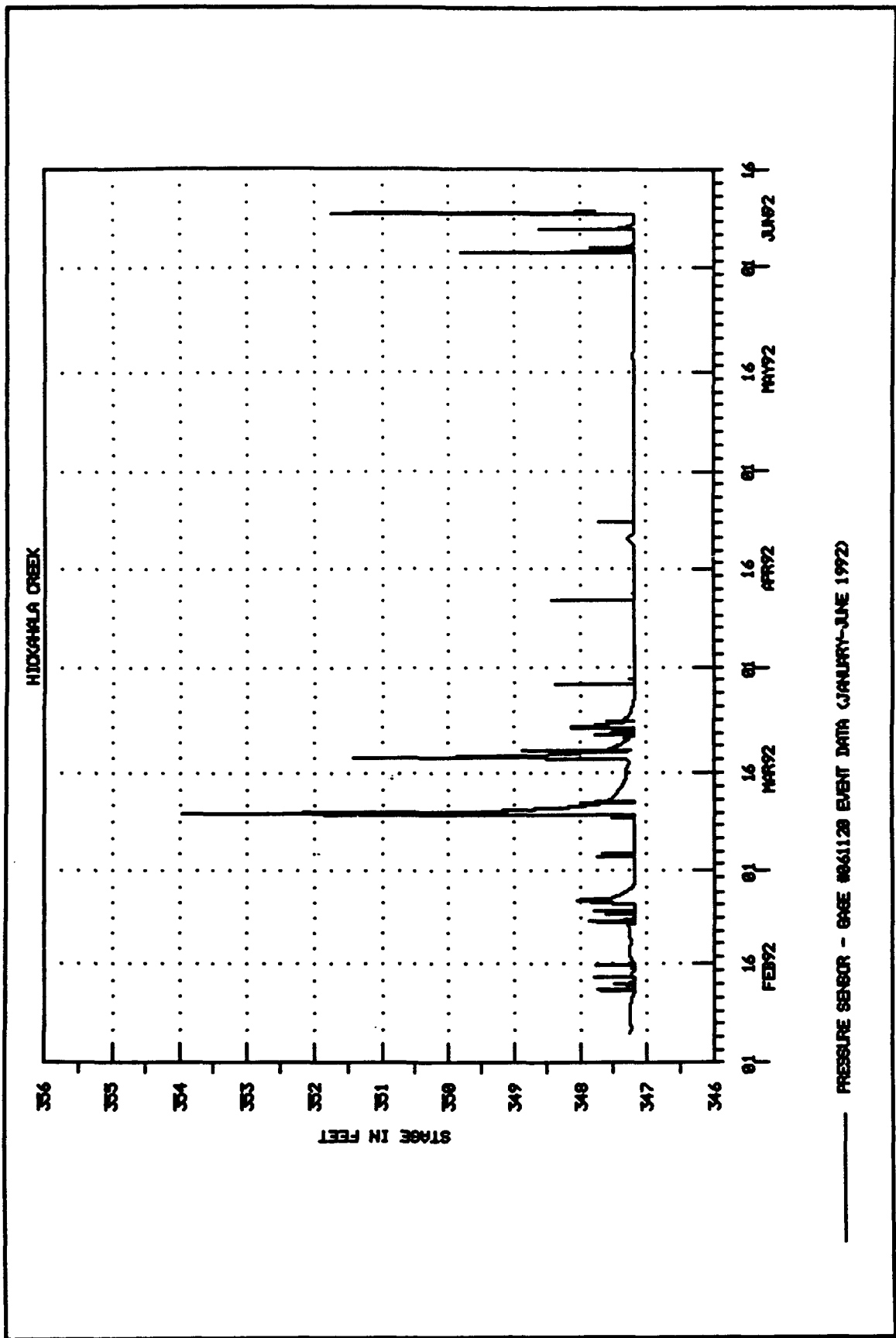
ABIACA CREEK WATERSHED ABIACA CREEK



OTOUCALOFA CREEK WATERSHED SARTER CREEK



NOT TO SCALE



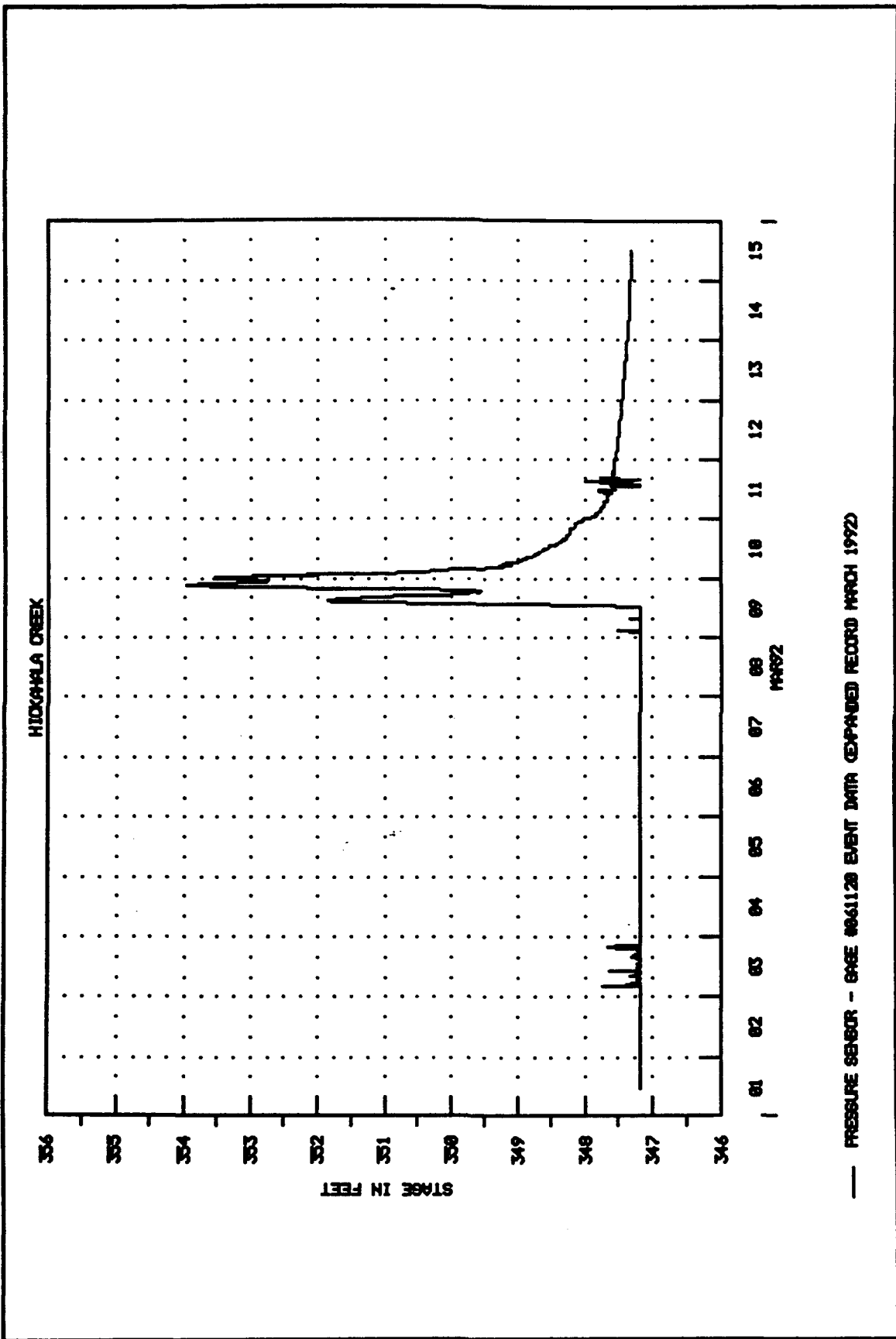
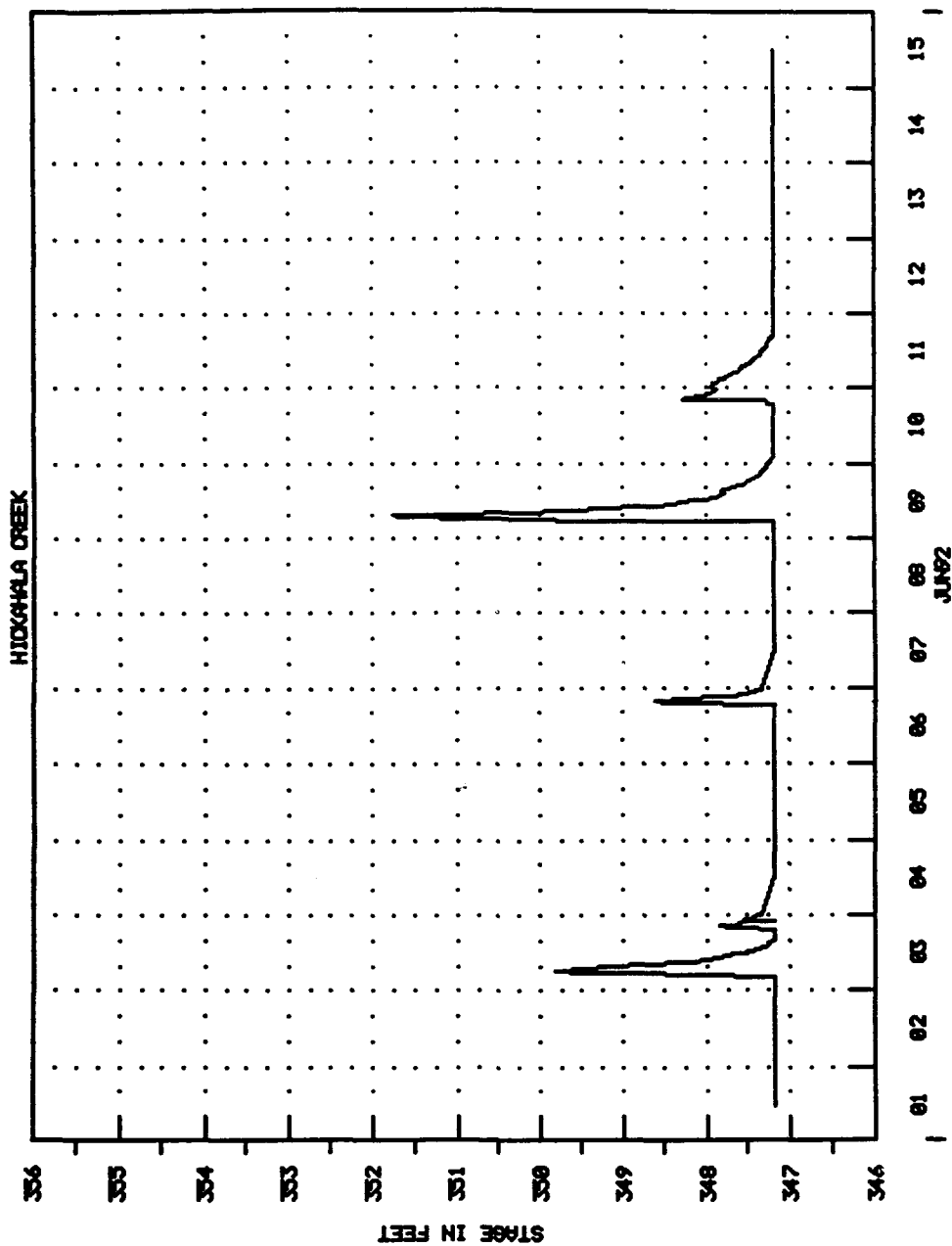


Plate D10



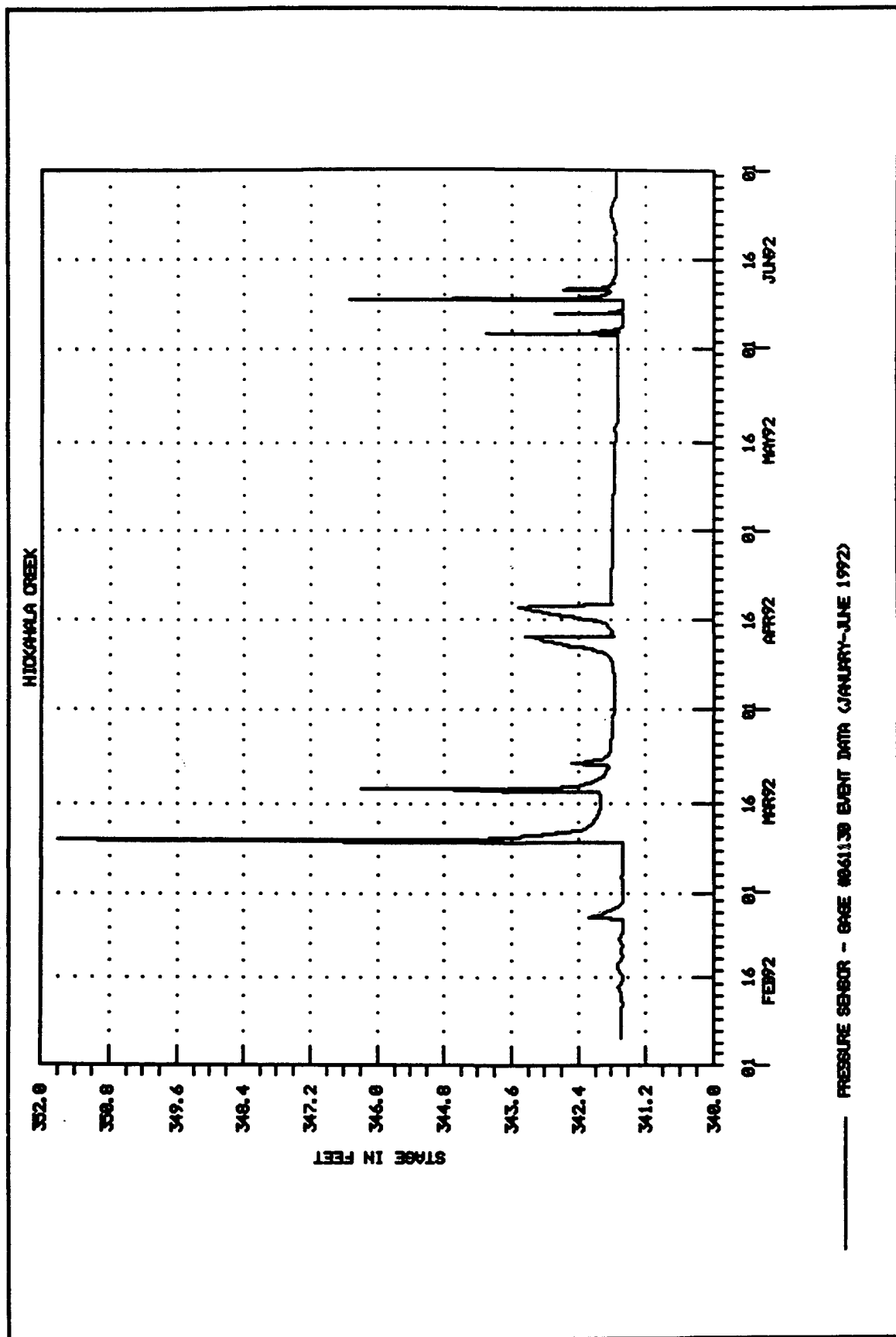
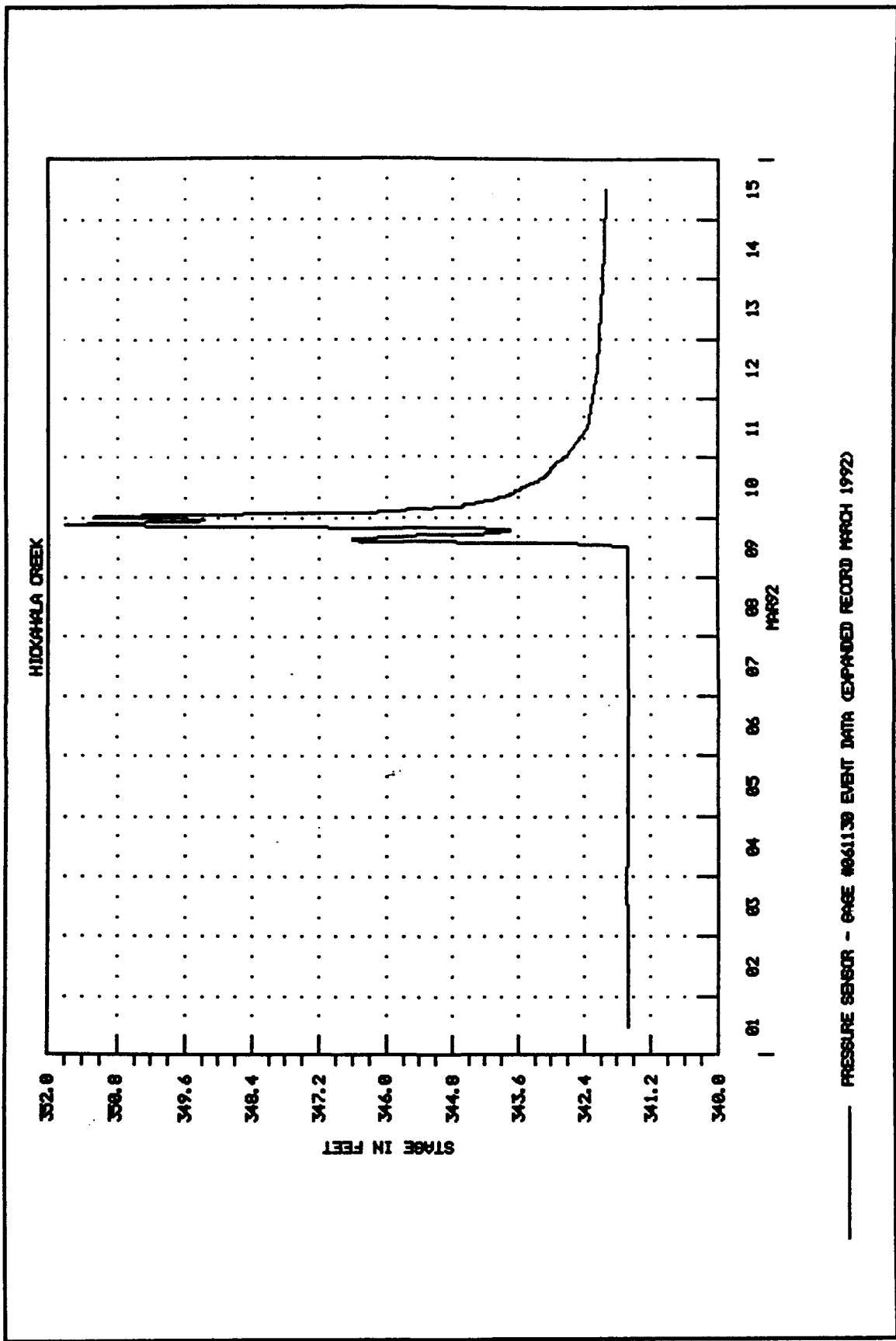


Plate D12



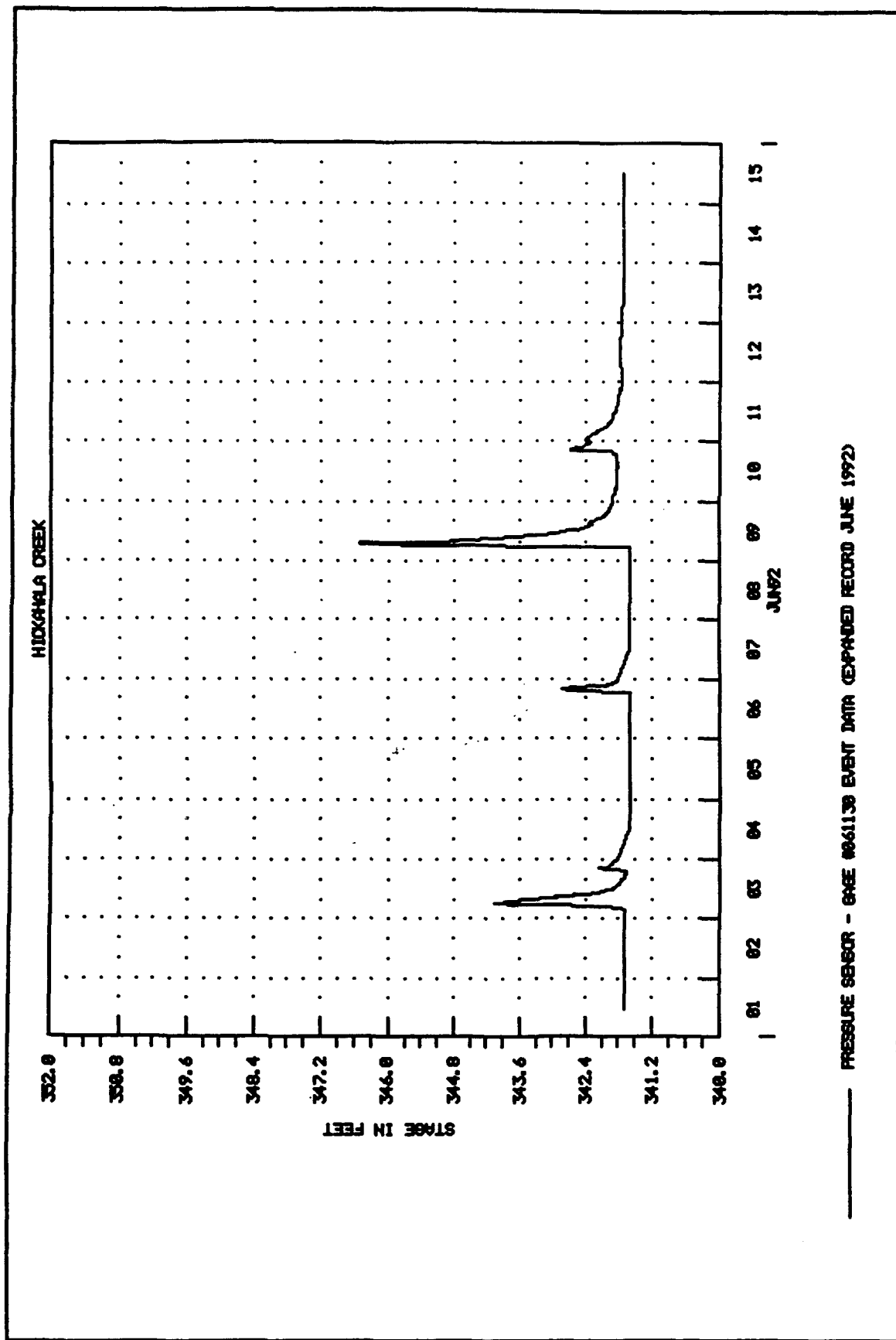


Plate D14

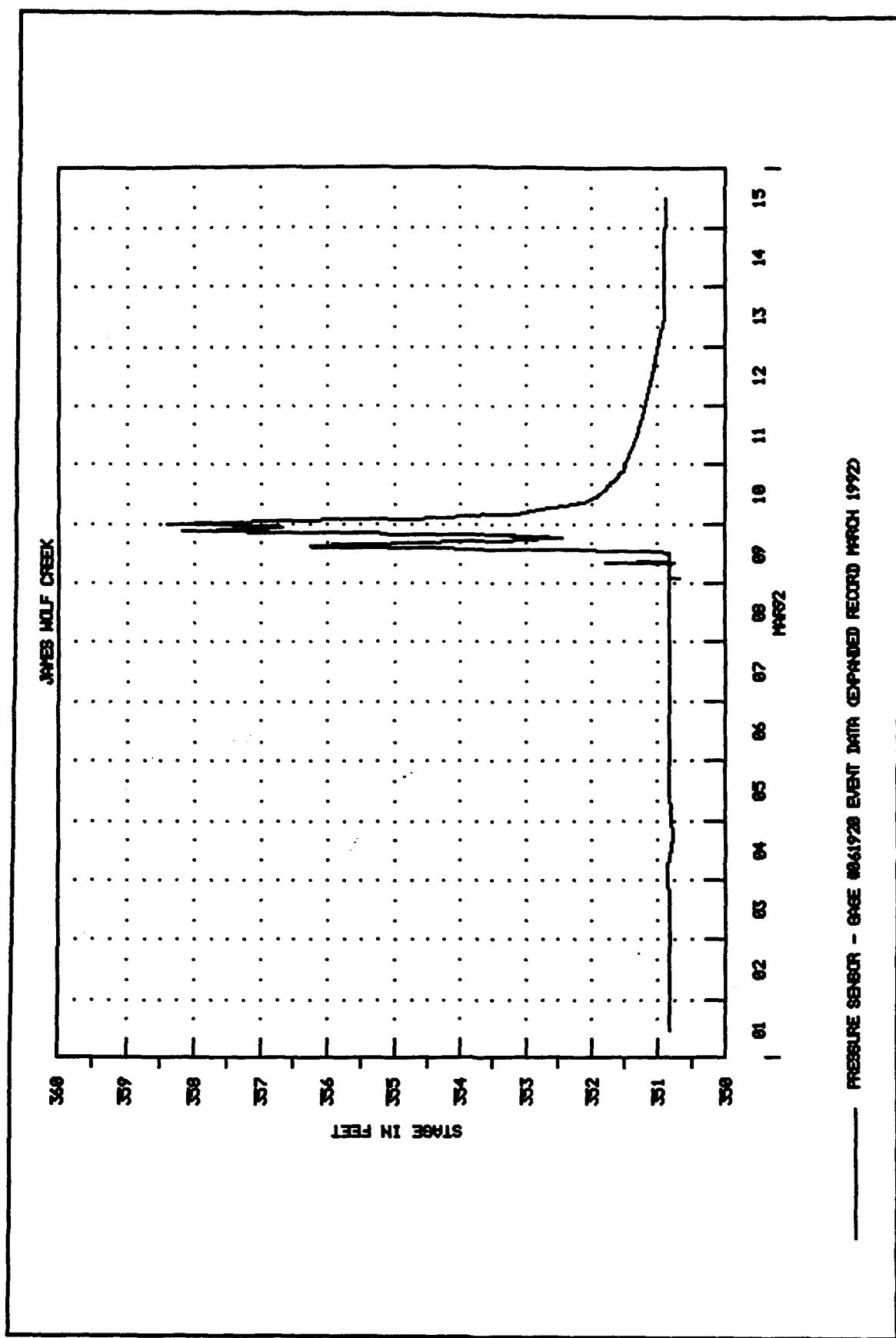
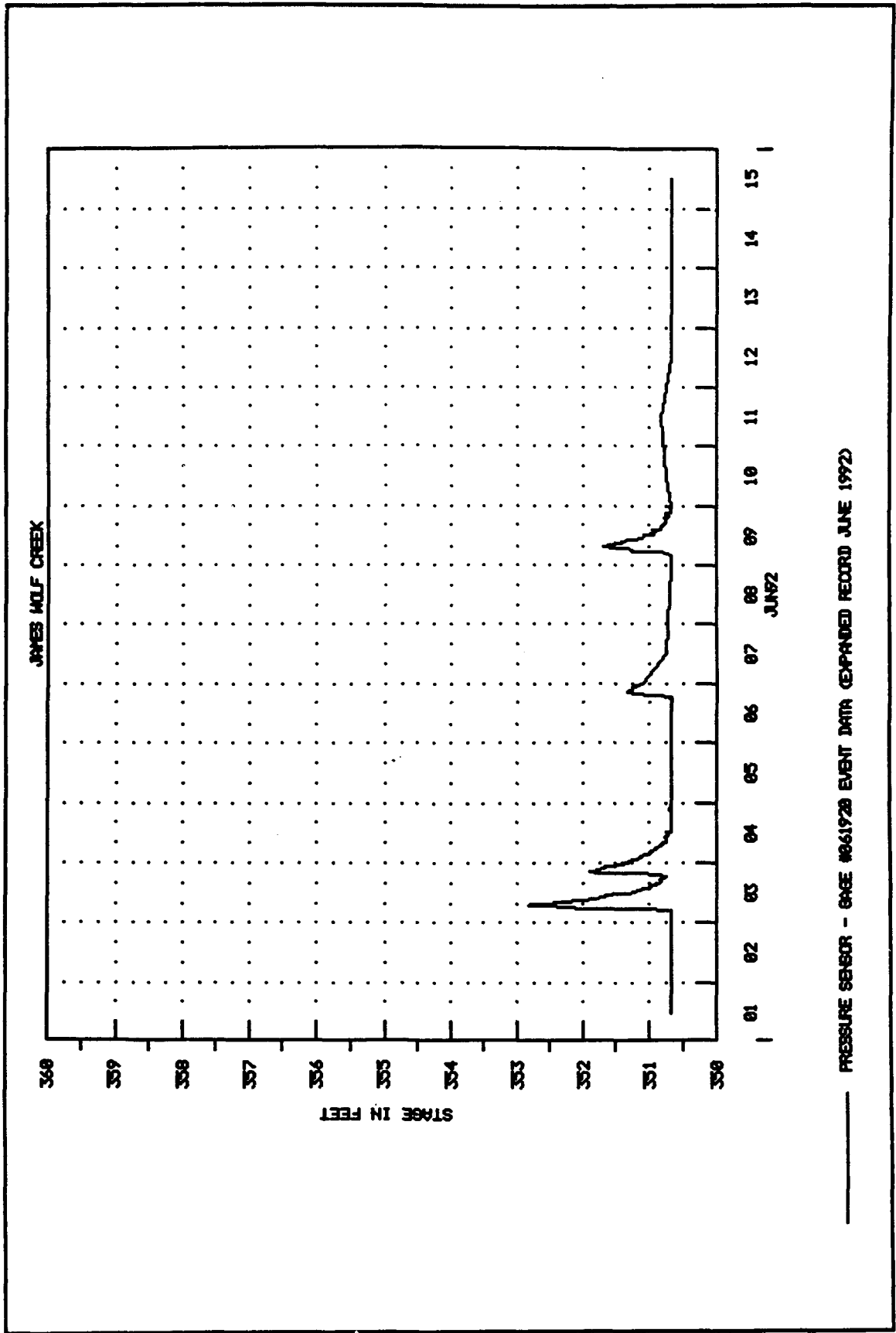
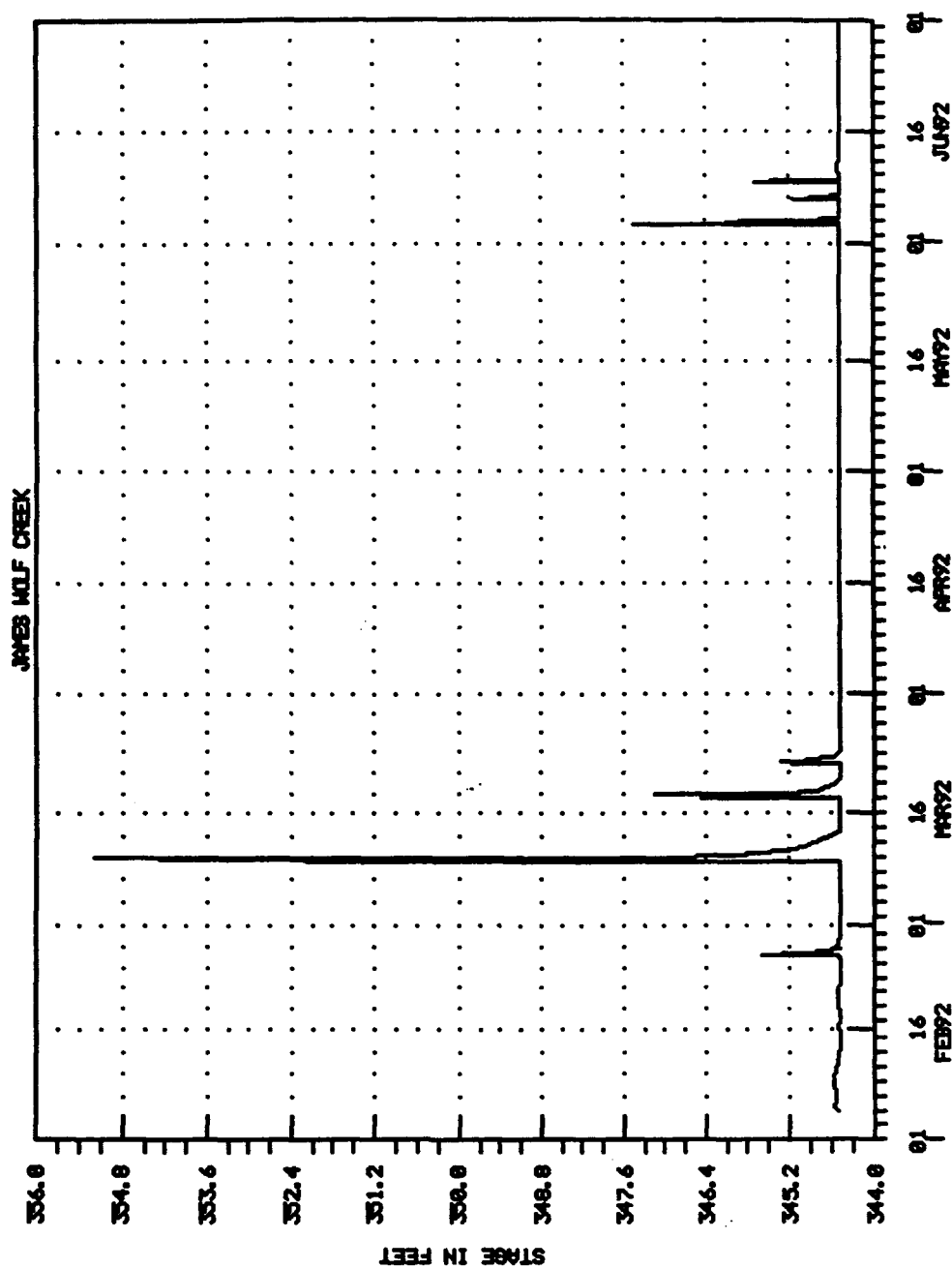
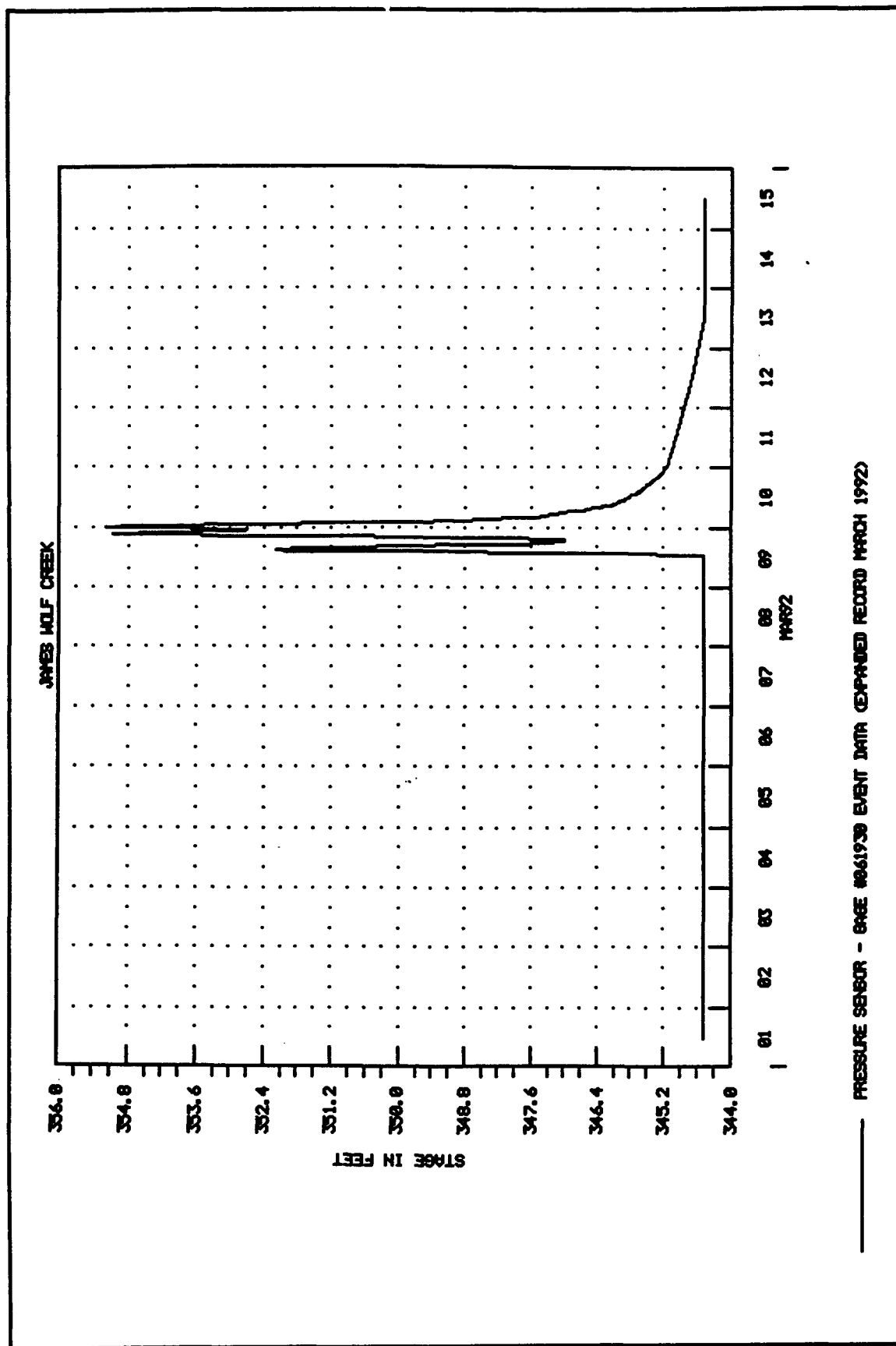


Plate D16





PRESSURE SENSOR - GAGE #061930 EVENT DATA (JANUARY-JUNE 1972)



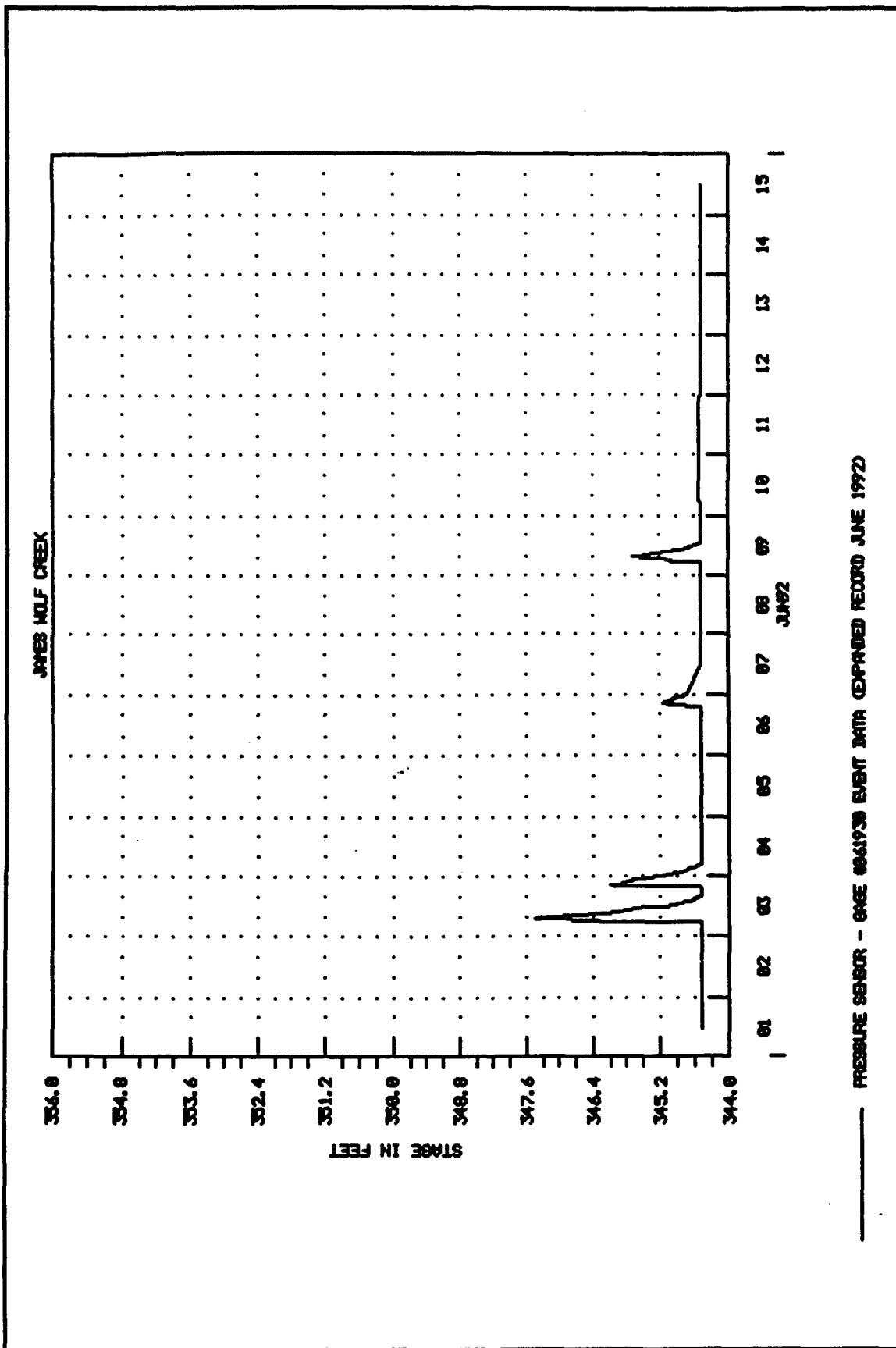
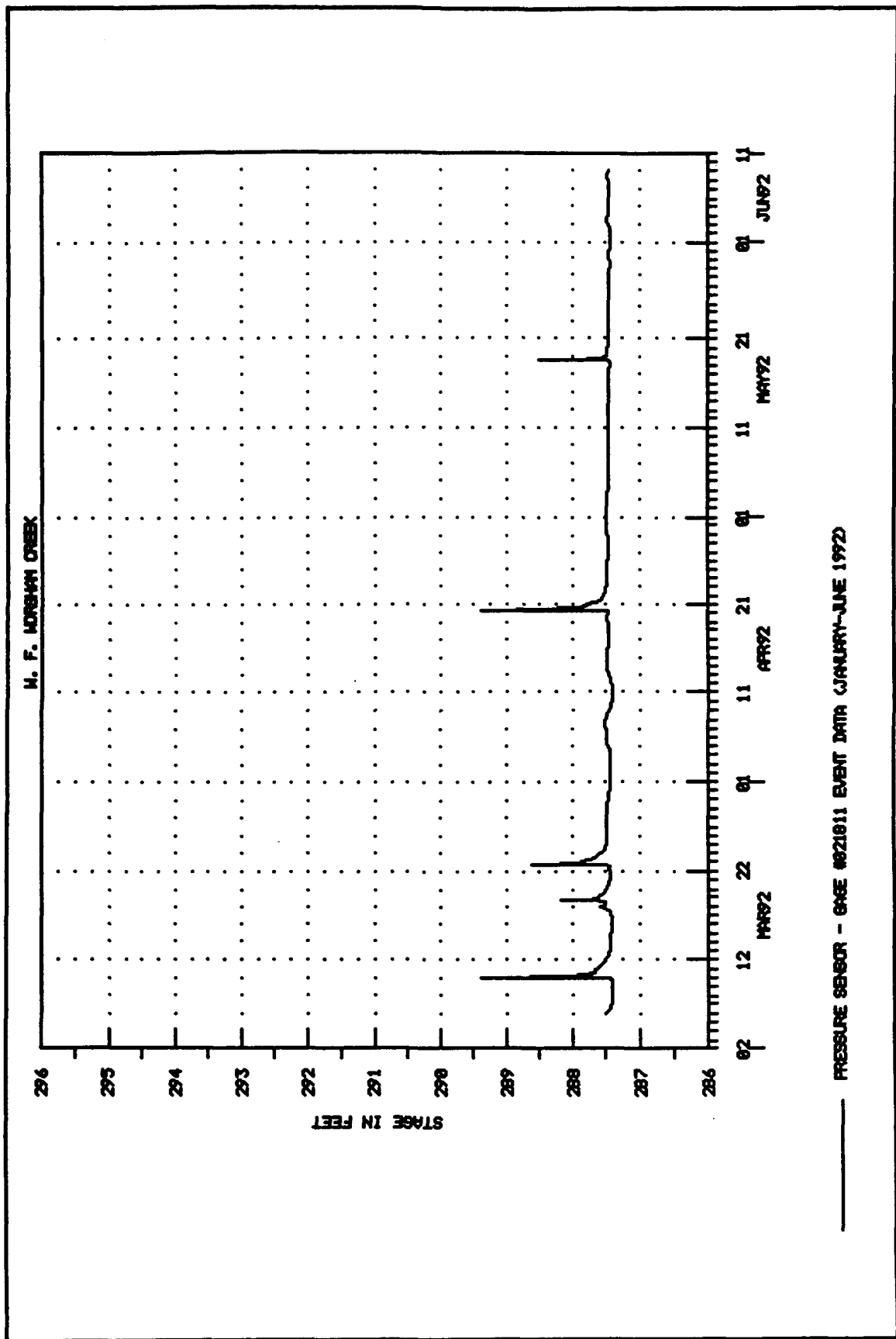


Plate D20



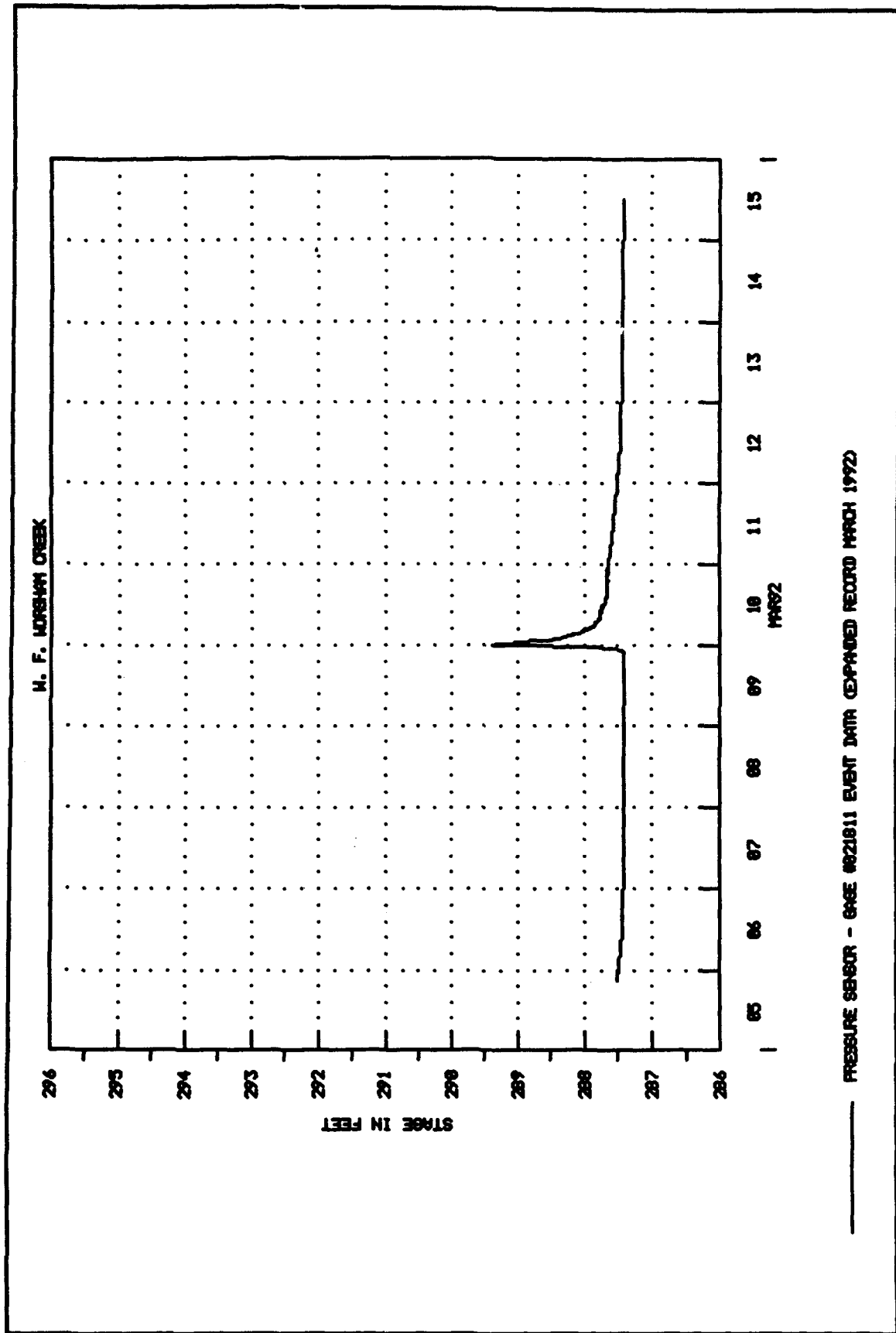
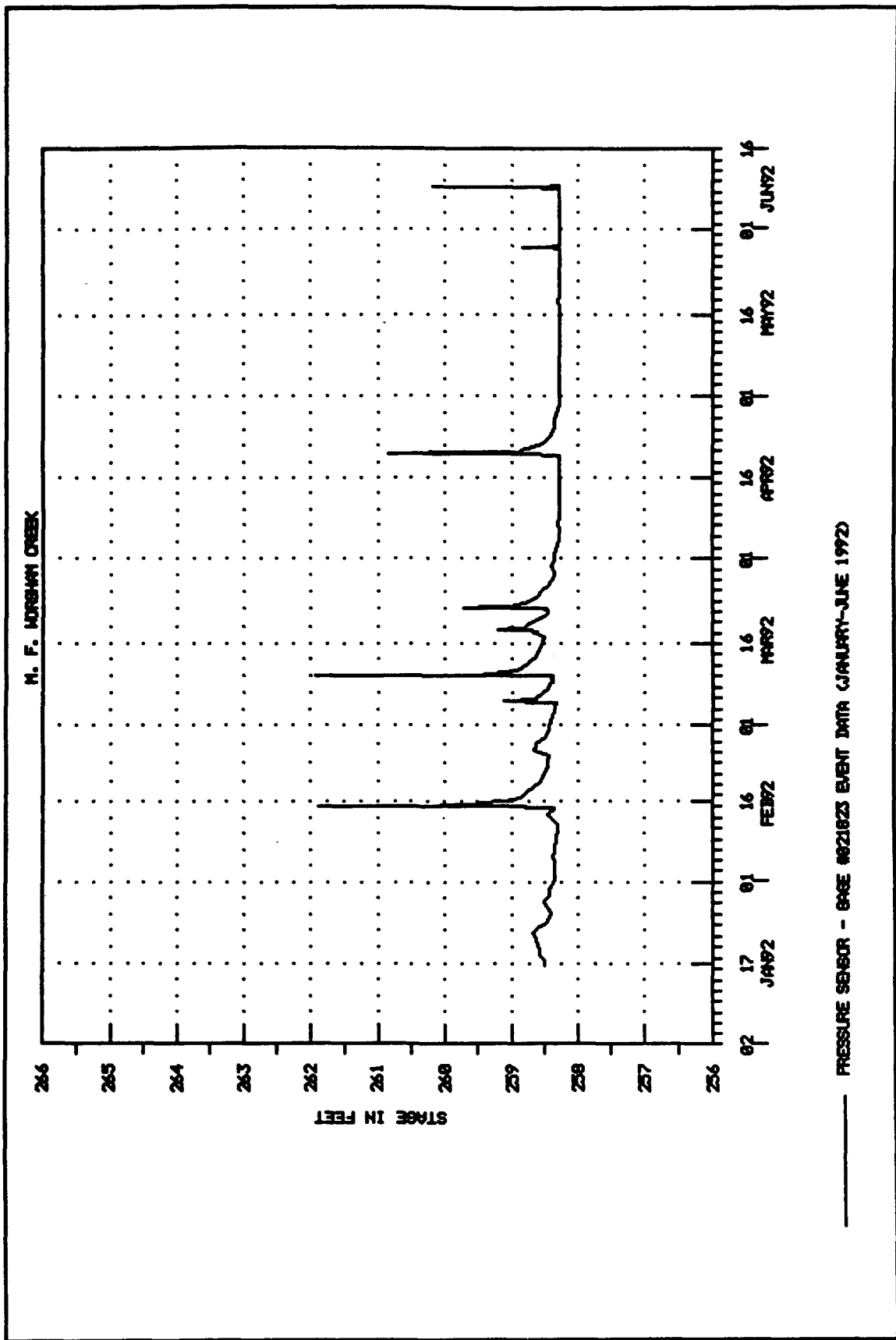


Plate D22



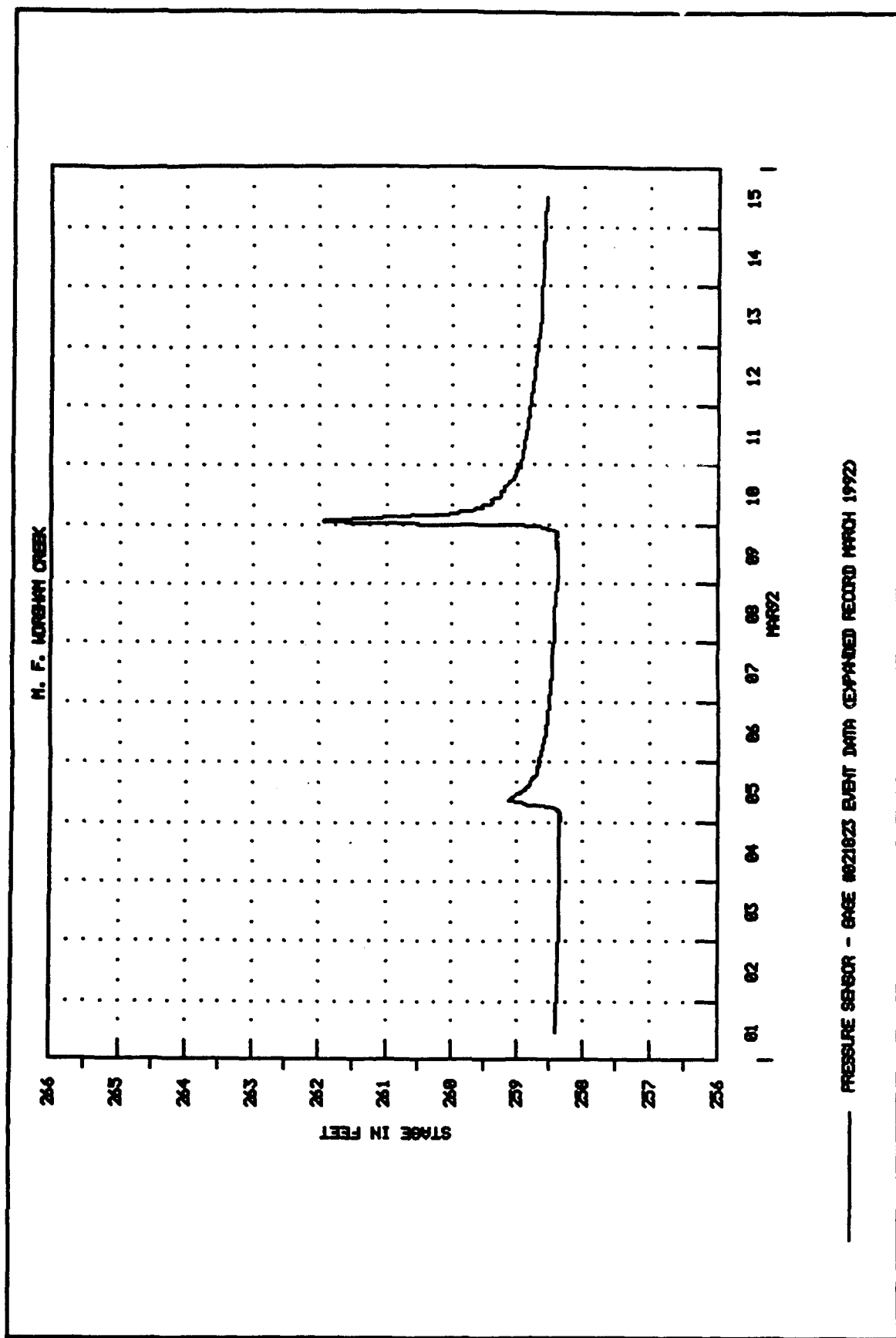
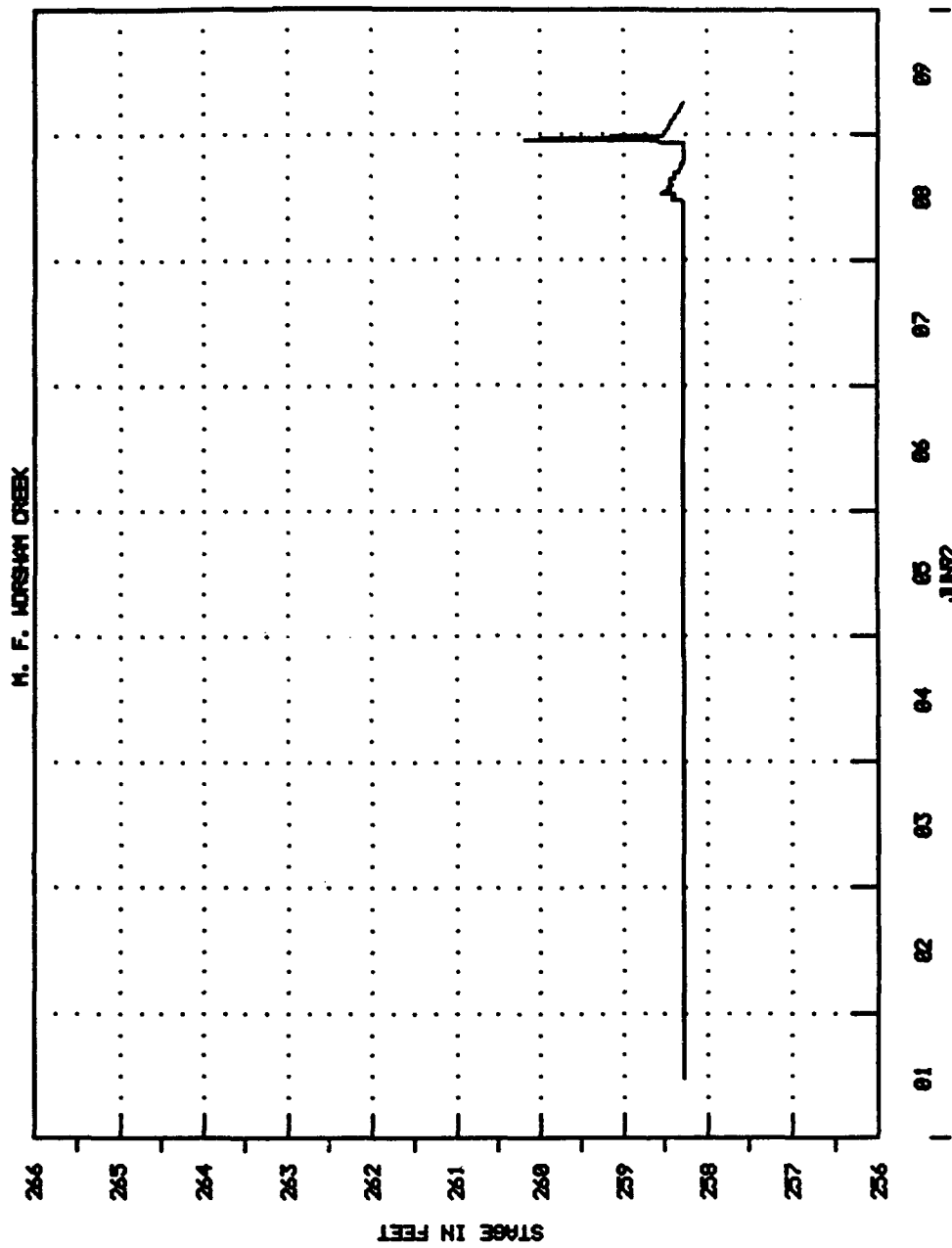


Plate D24



——— PRESSURE SENSOR - GAGE #021823 EVENT DATA (EXPANDED RECORD JUNE 1992)

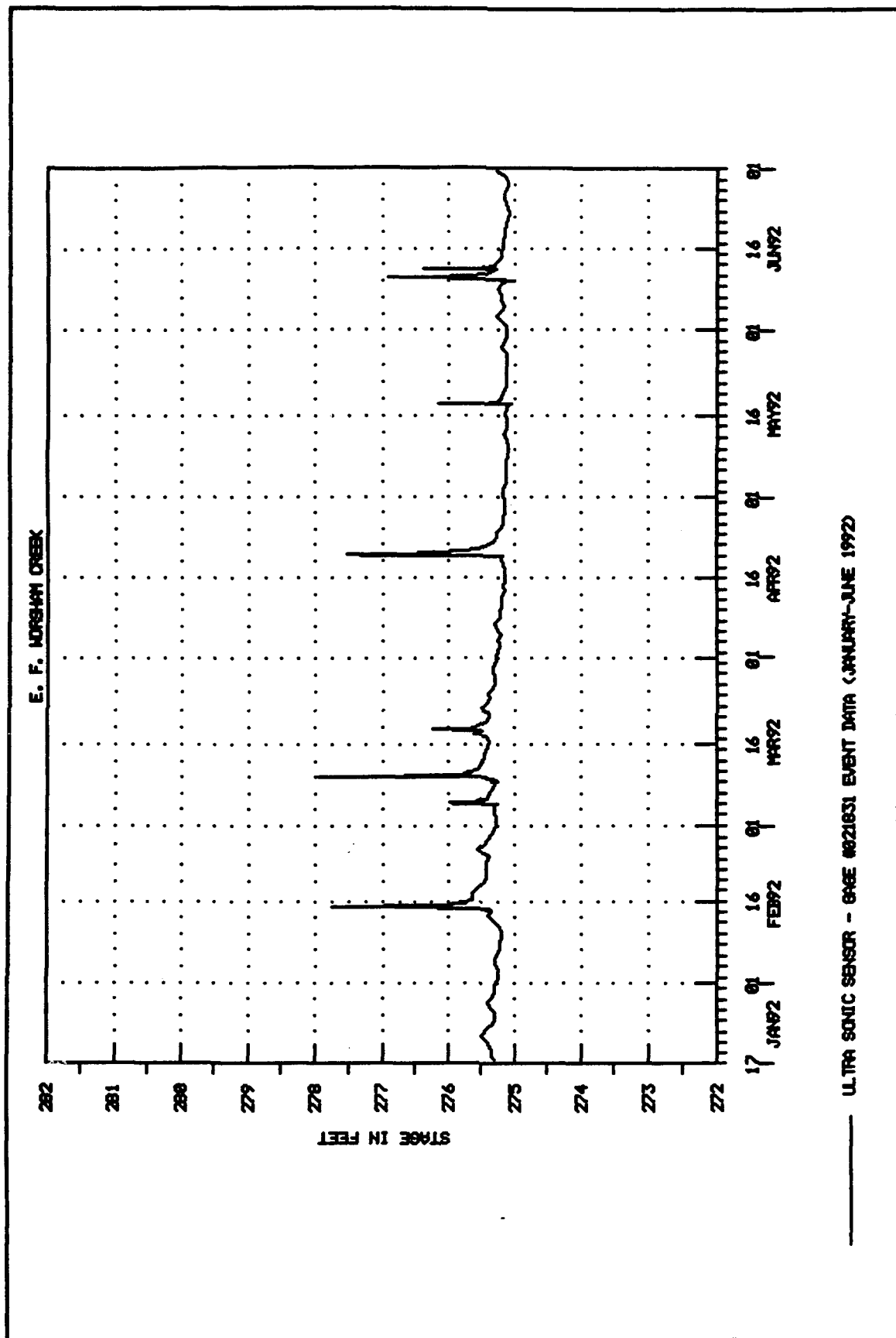
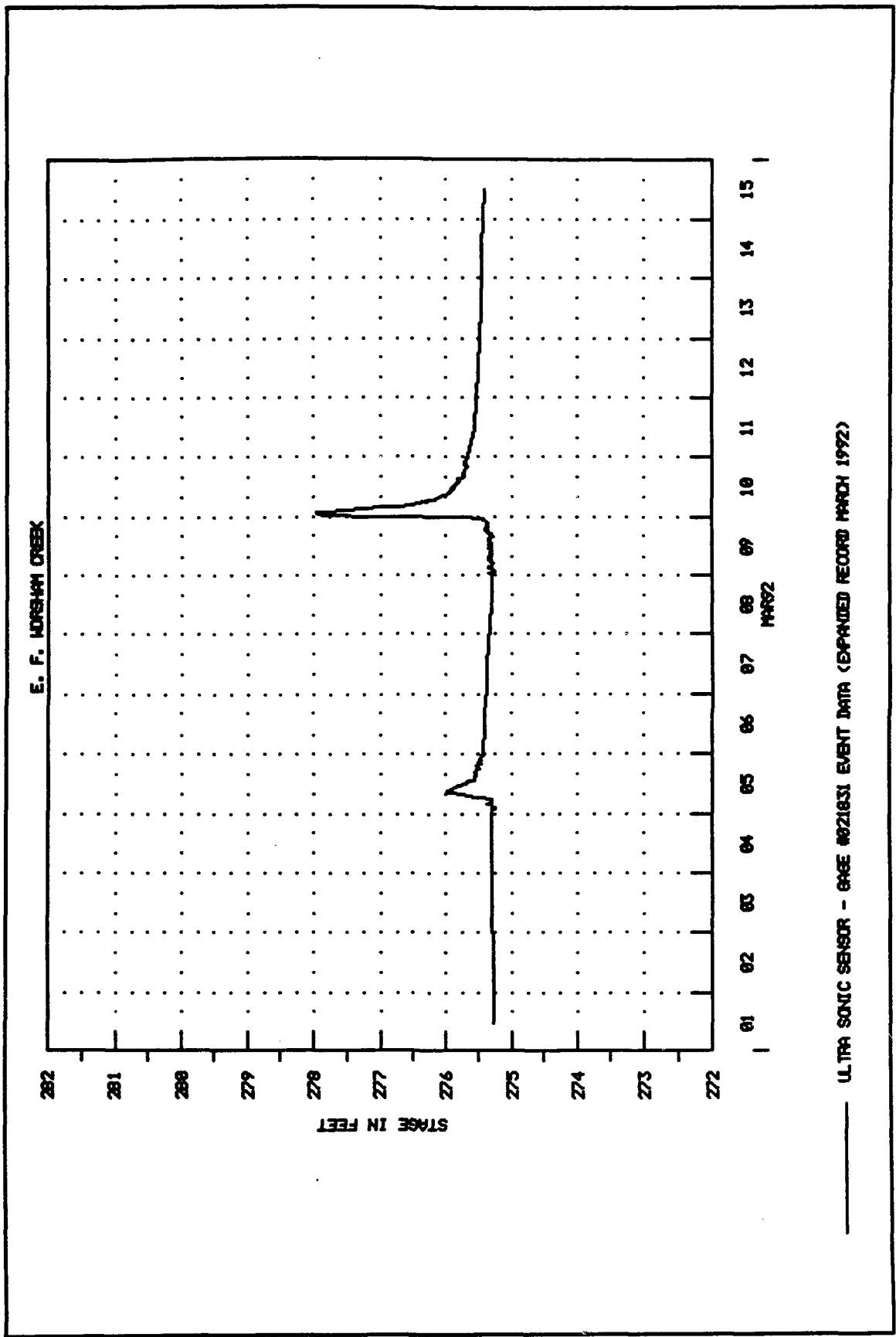
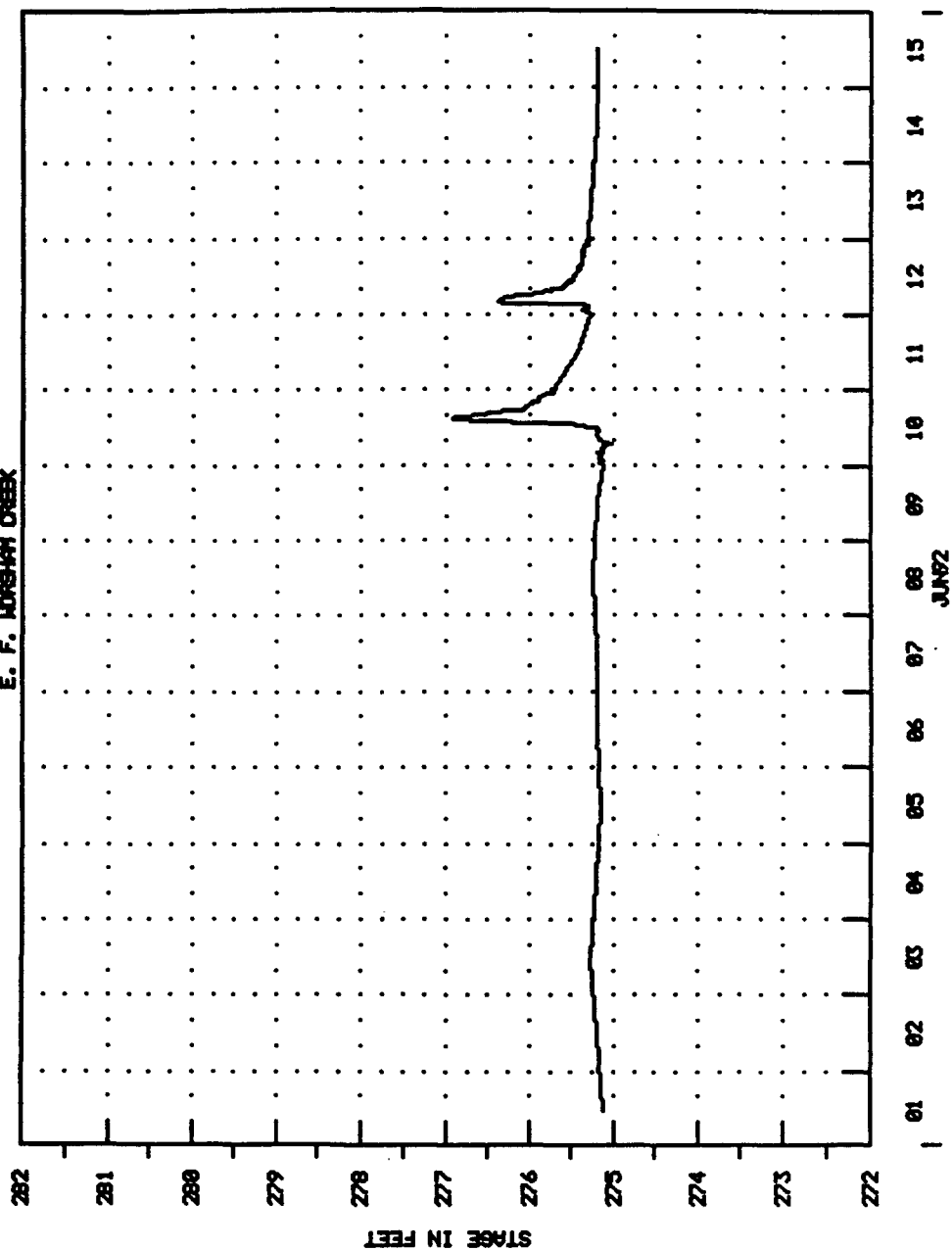


Plate D26



E. F. JOHNSON CREEK



ULTRA SONIC SENSOR - GAGE #021831 EVENT DATA (EXPANDED RECORD JUNE 1992)

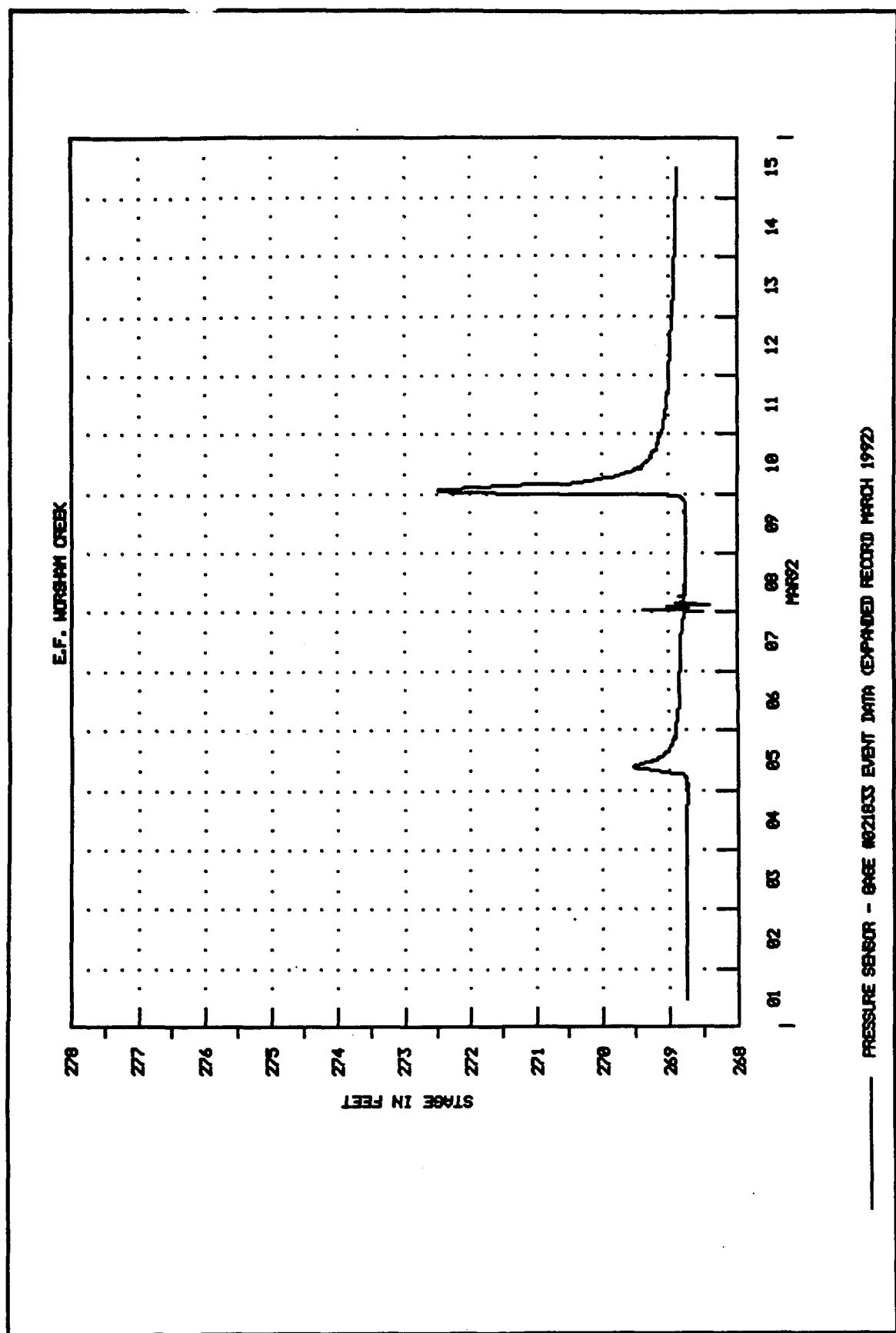
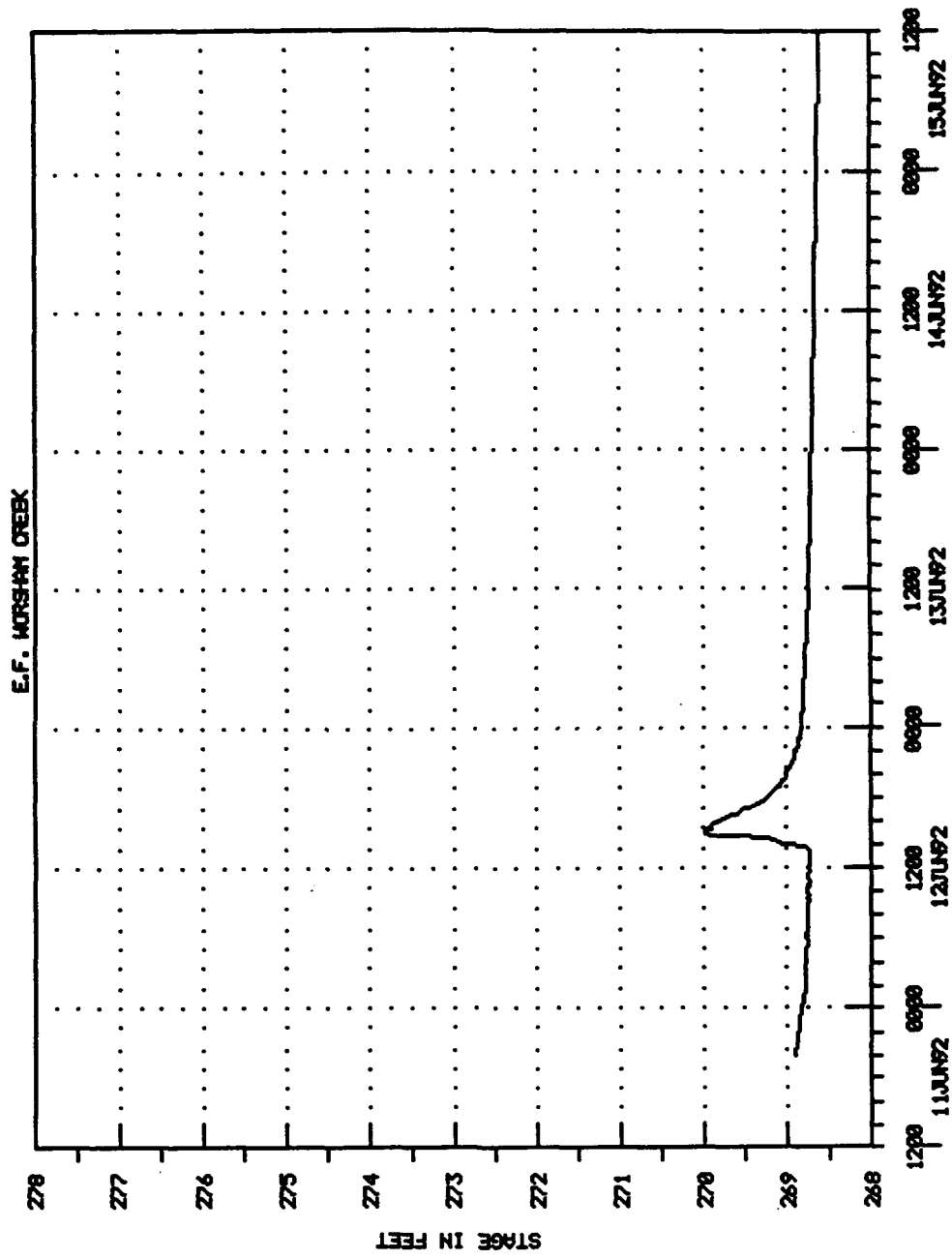


Plate D30



____ PRESSURE SENSOR - GAGE #021833 EVENT DATA EXPANDED RECORD JUNE 1992

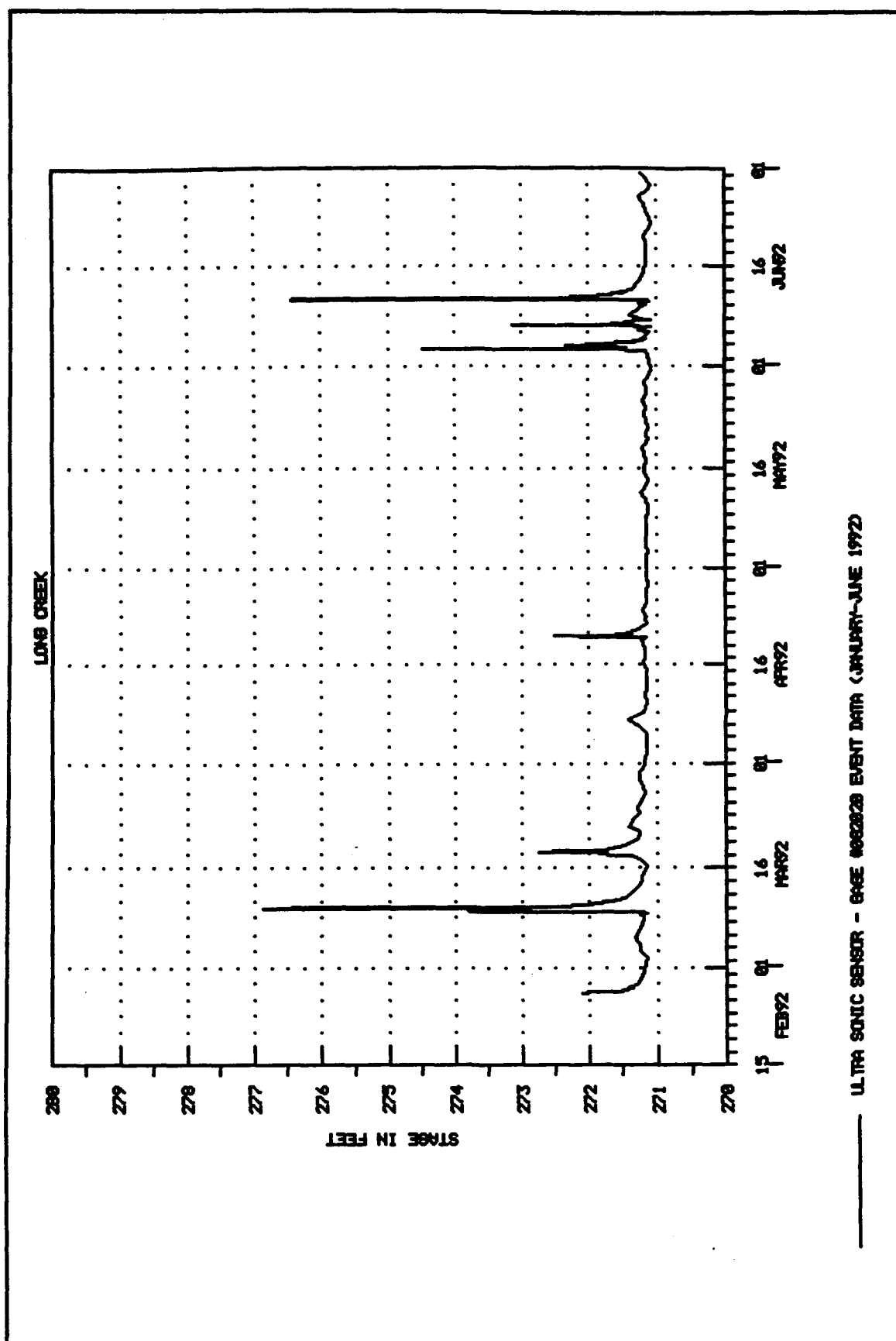
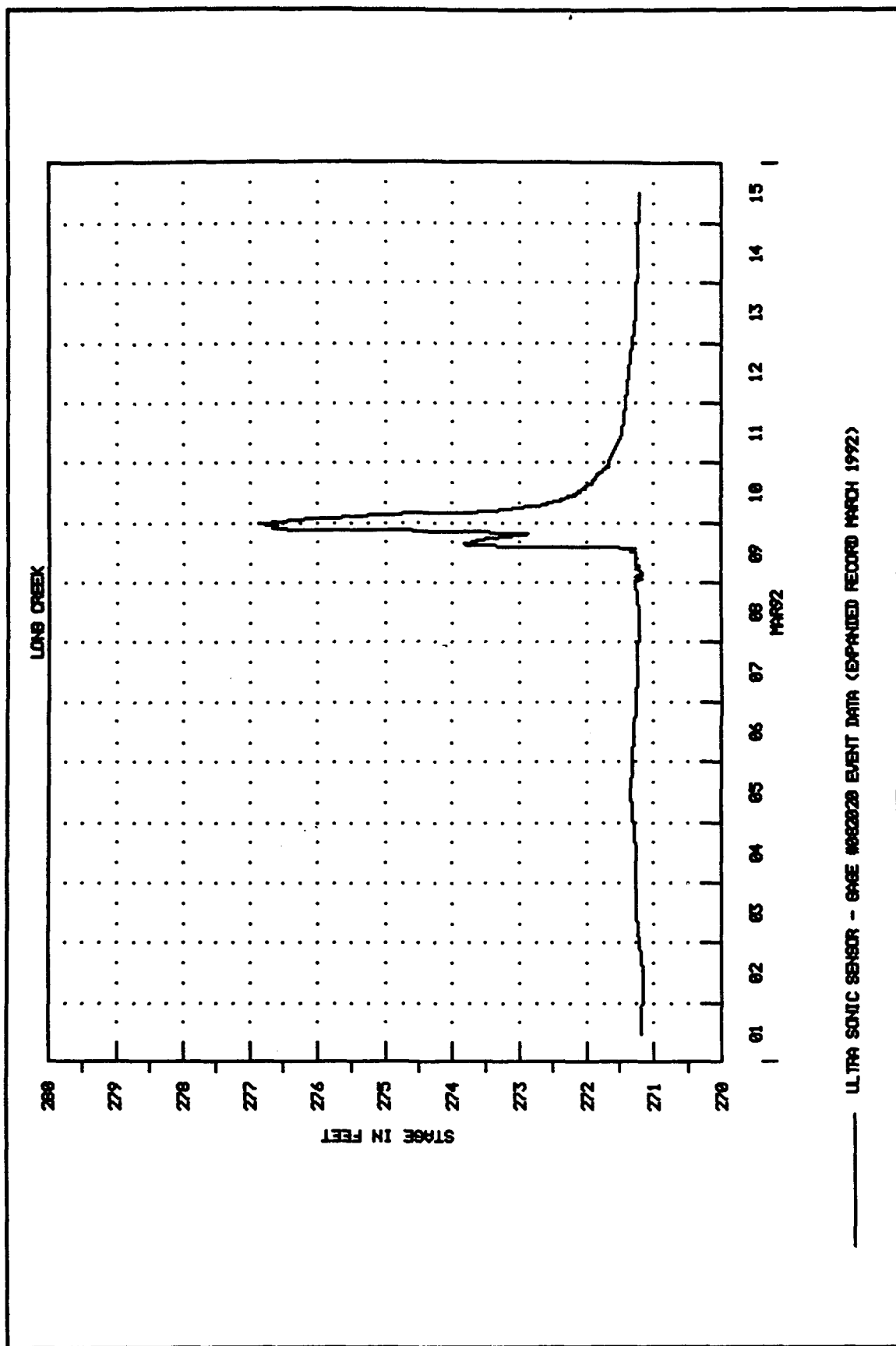


Plate D32



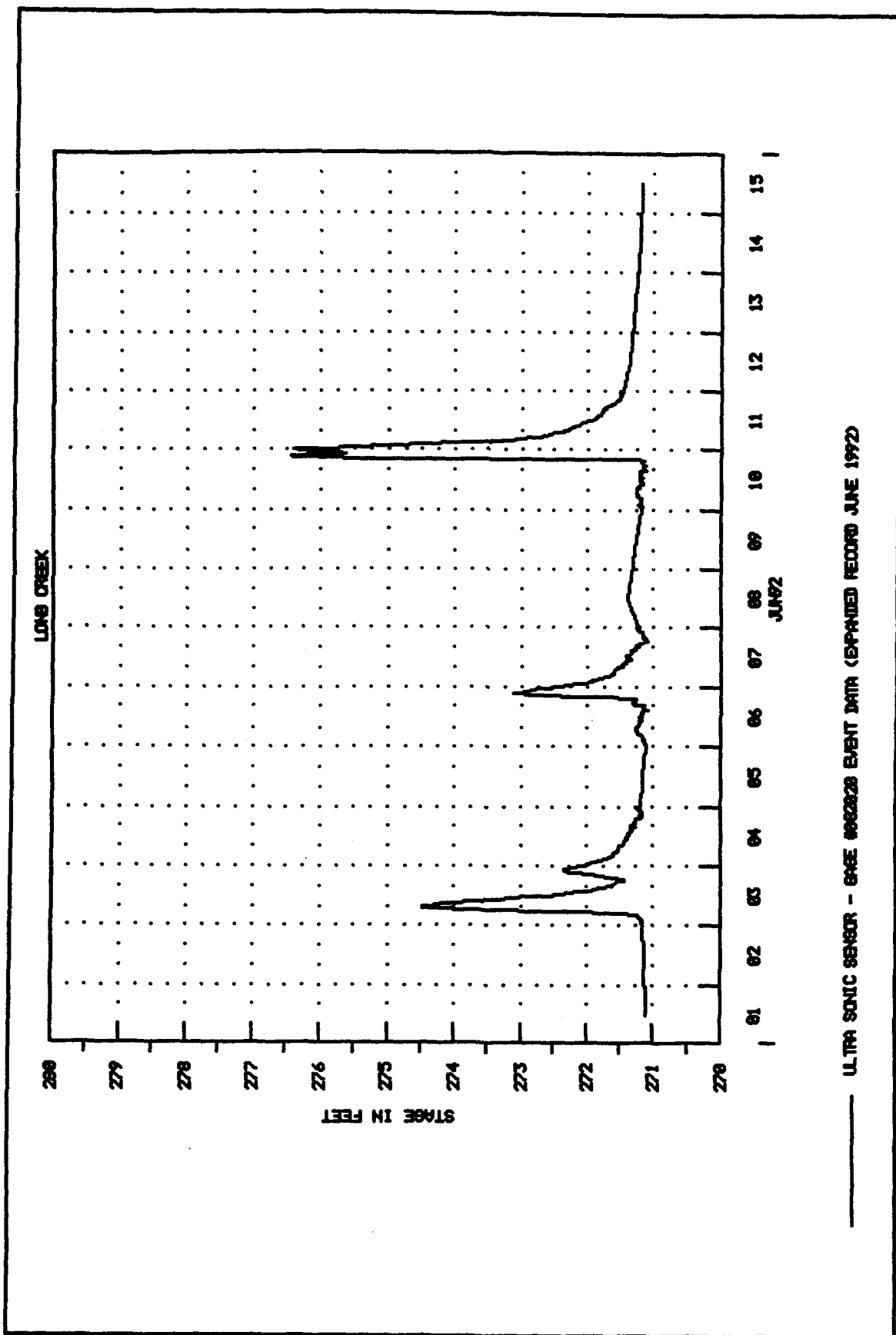
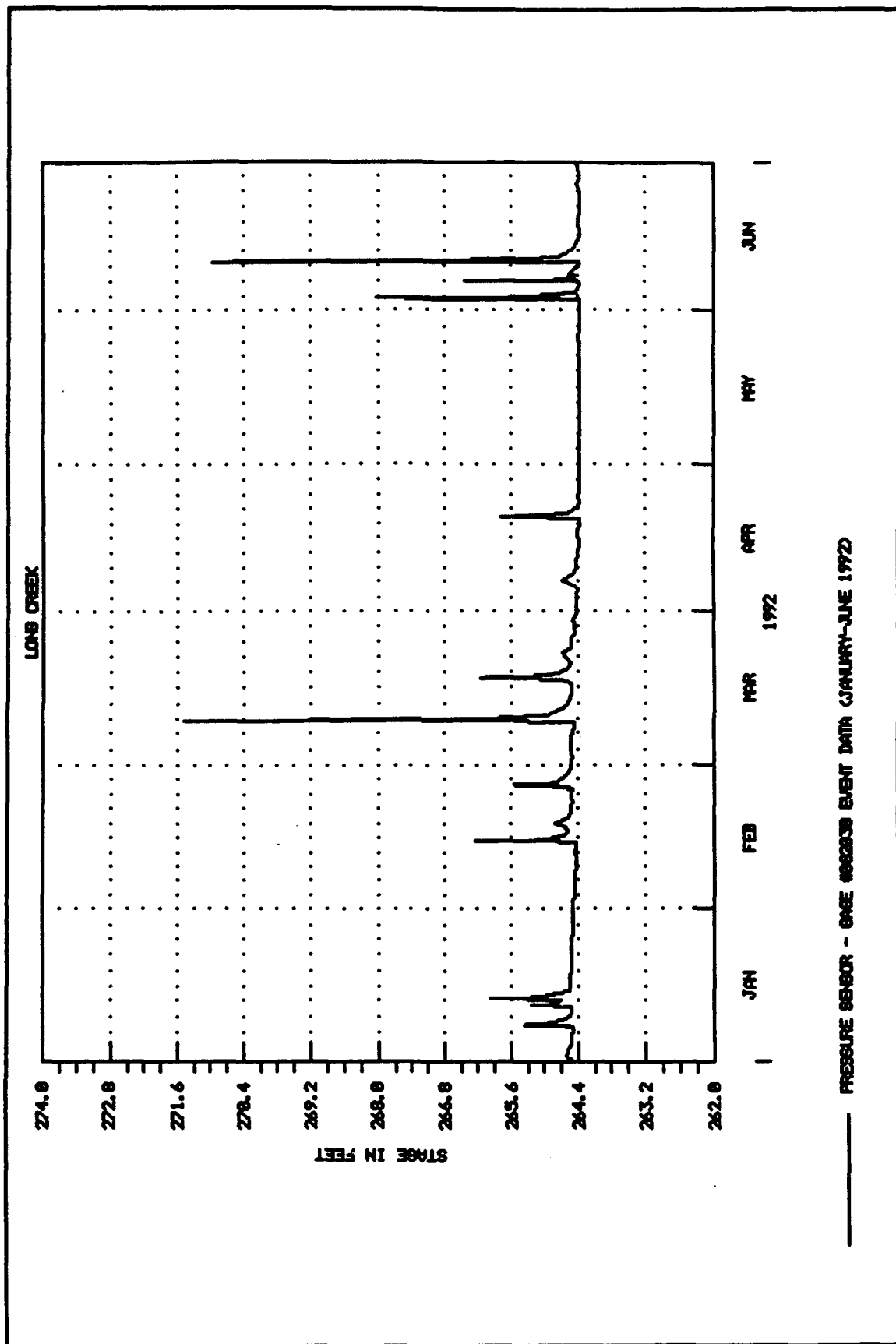
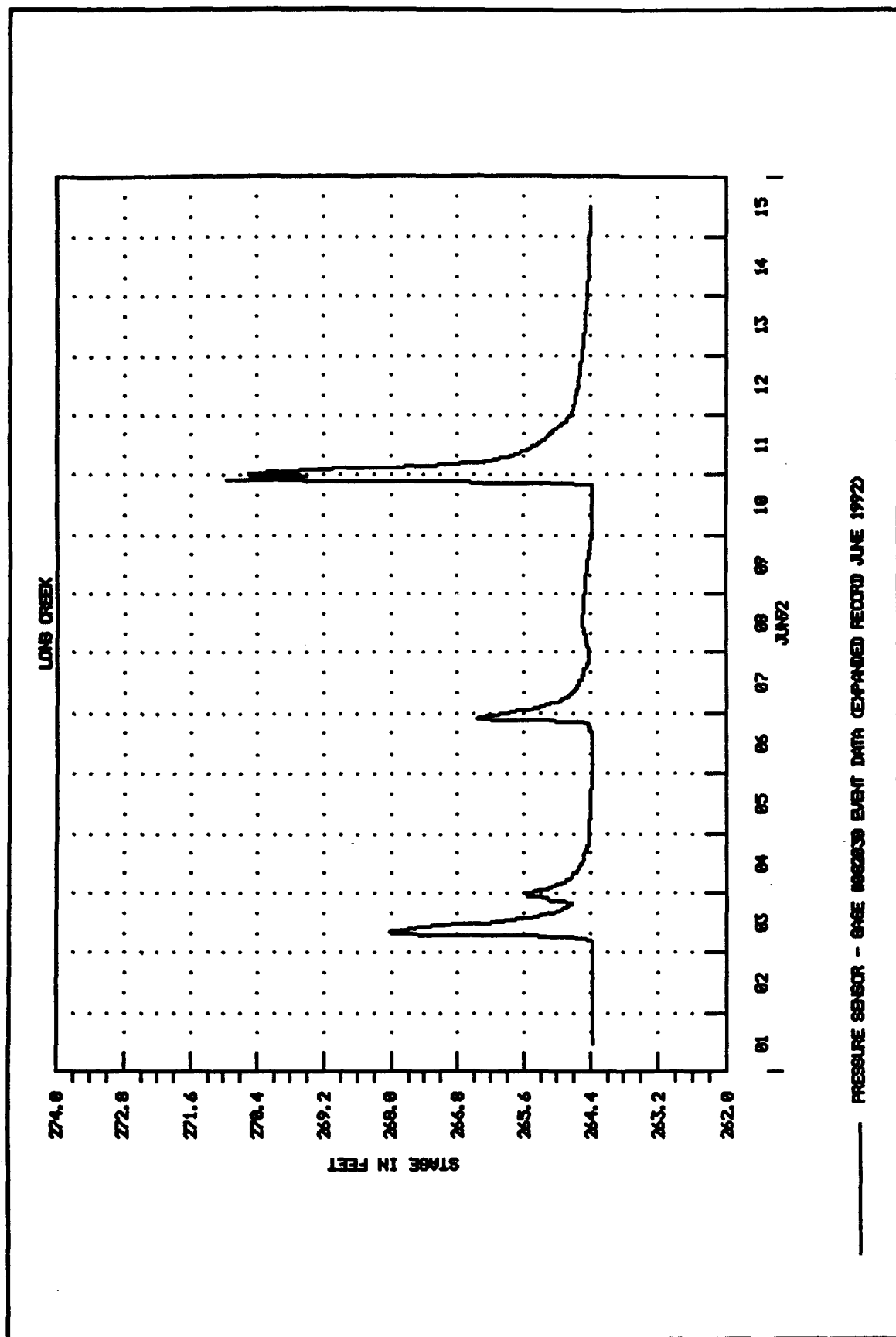
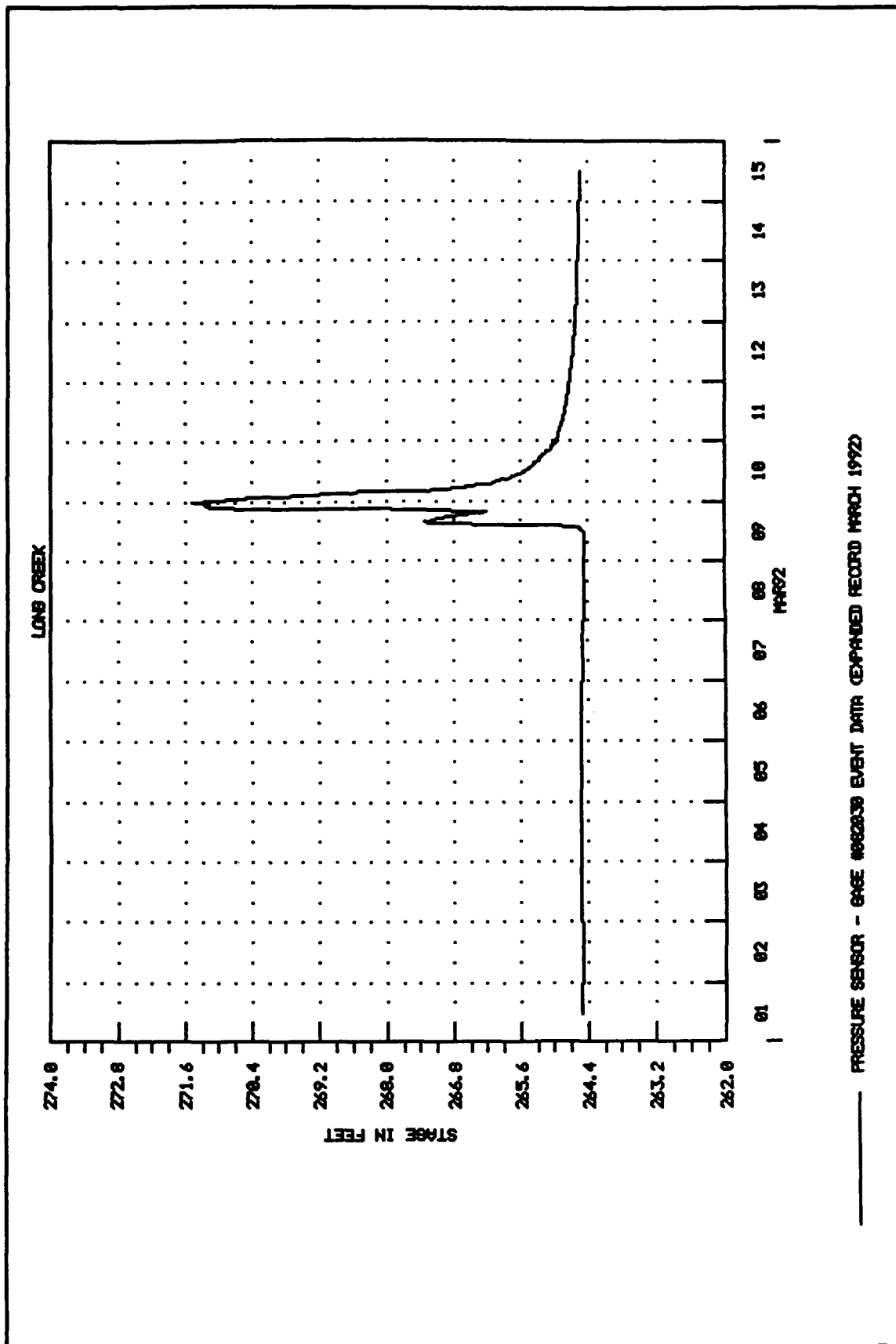


Plate D34







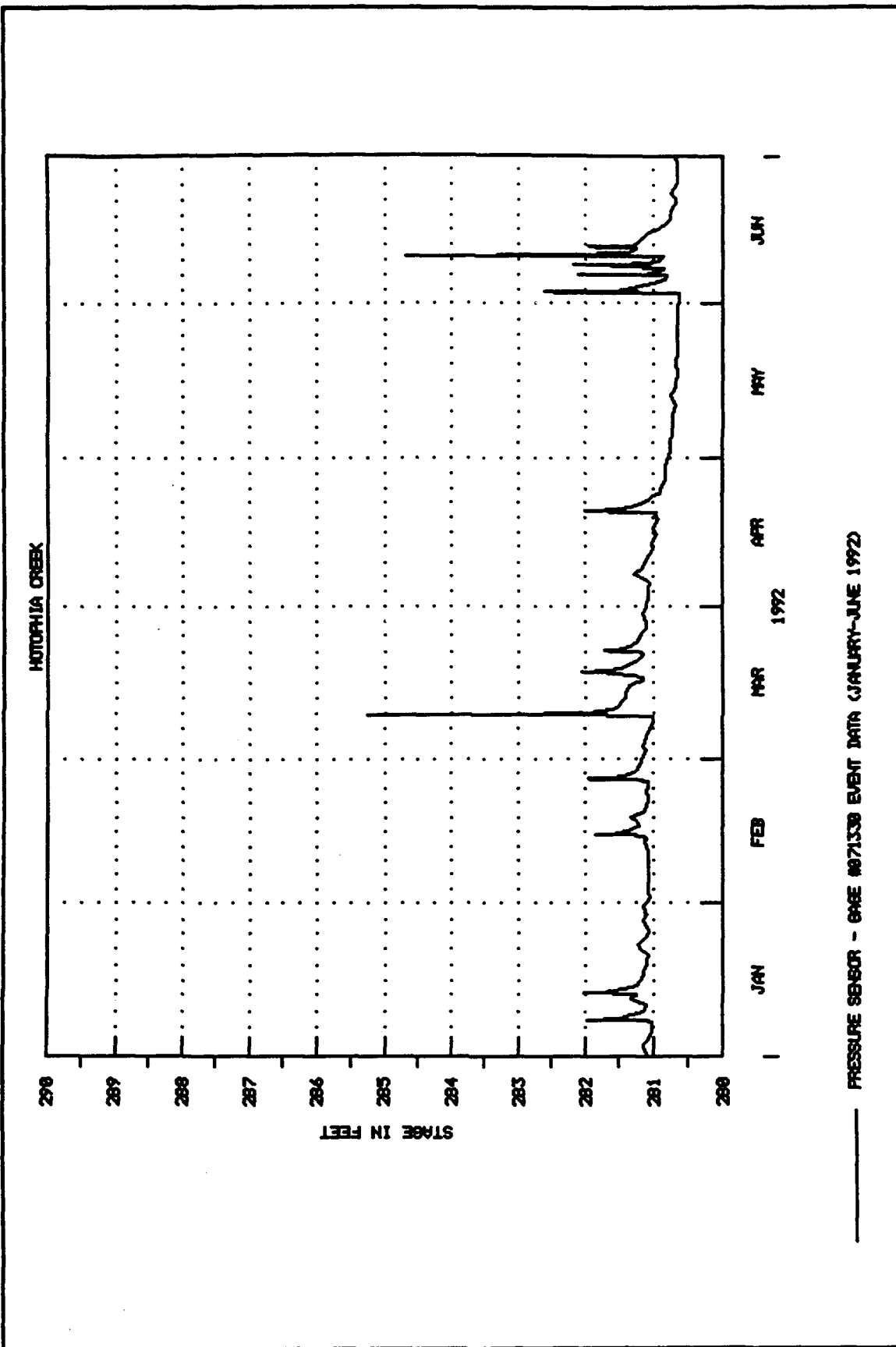
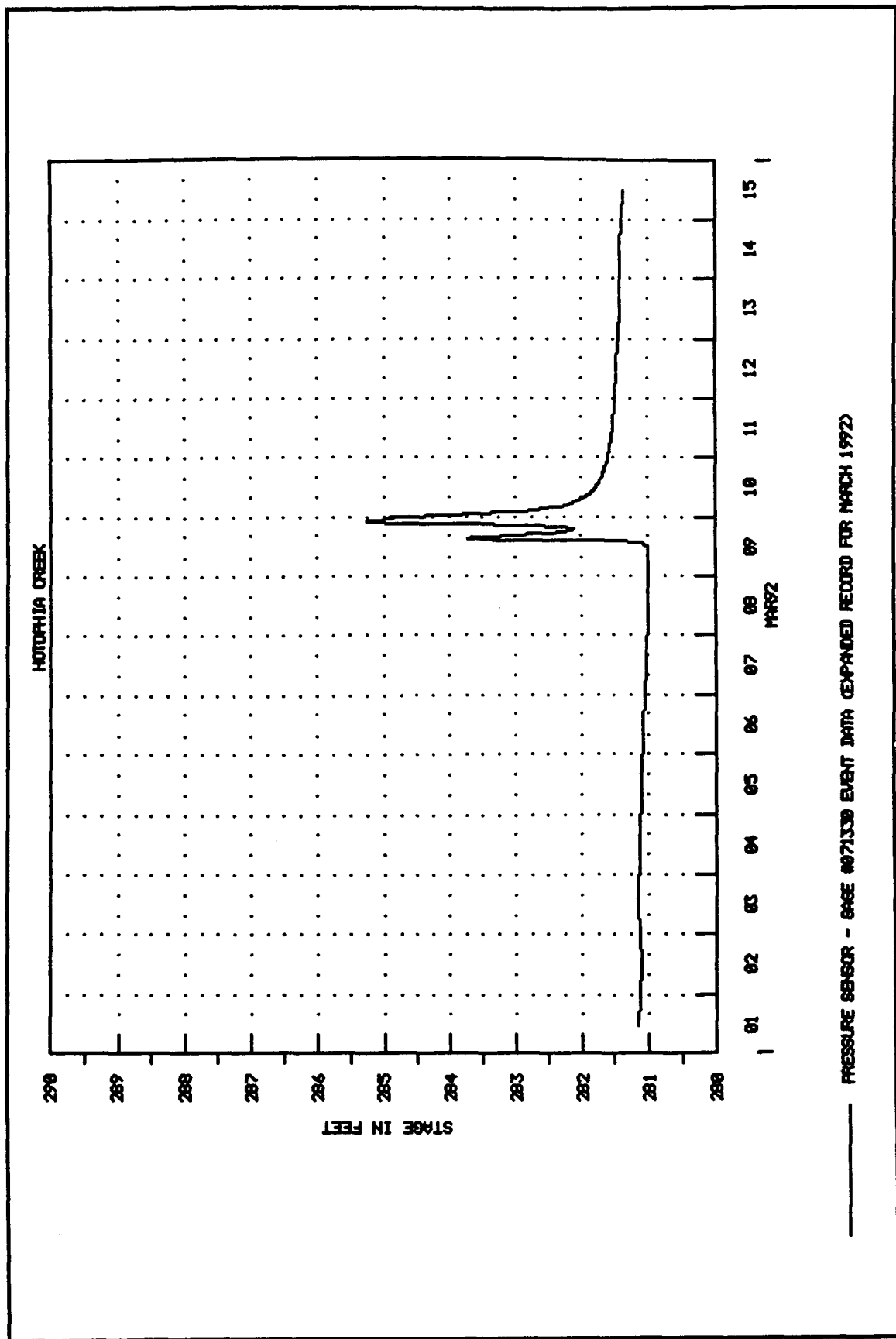


Plate D38



____ PRESSURE SENSOR - GAGE #071330 EVENT DATA (EXPANDED RECORD FOR MARCH 1992)

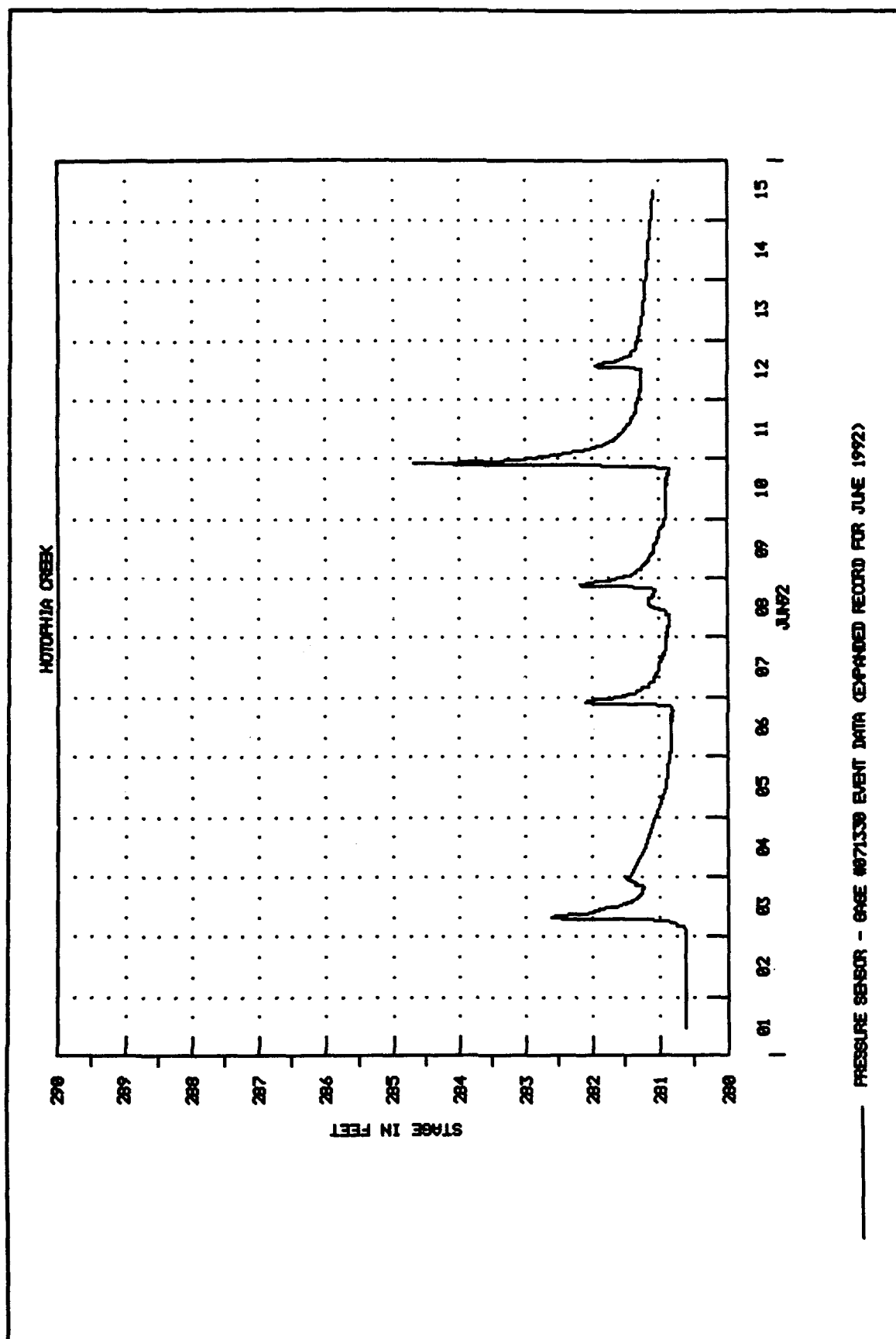
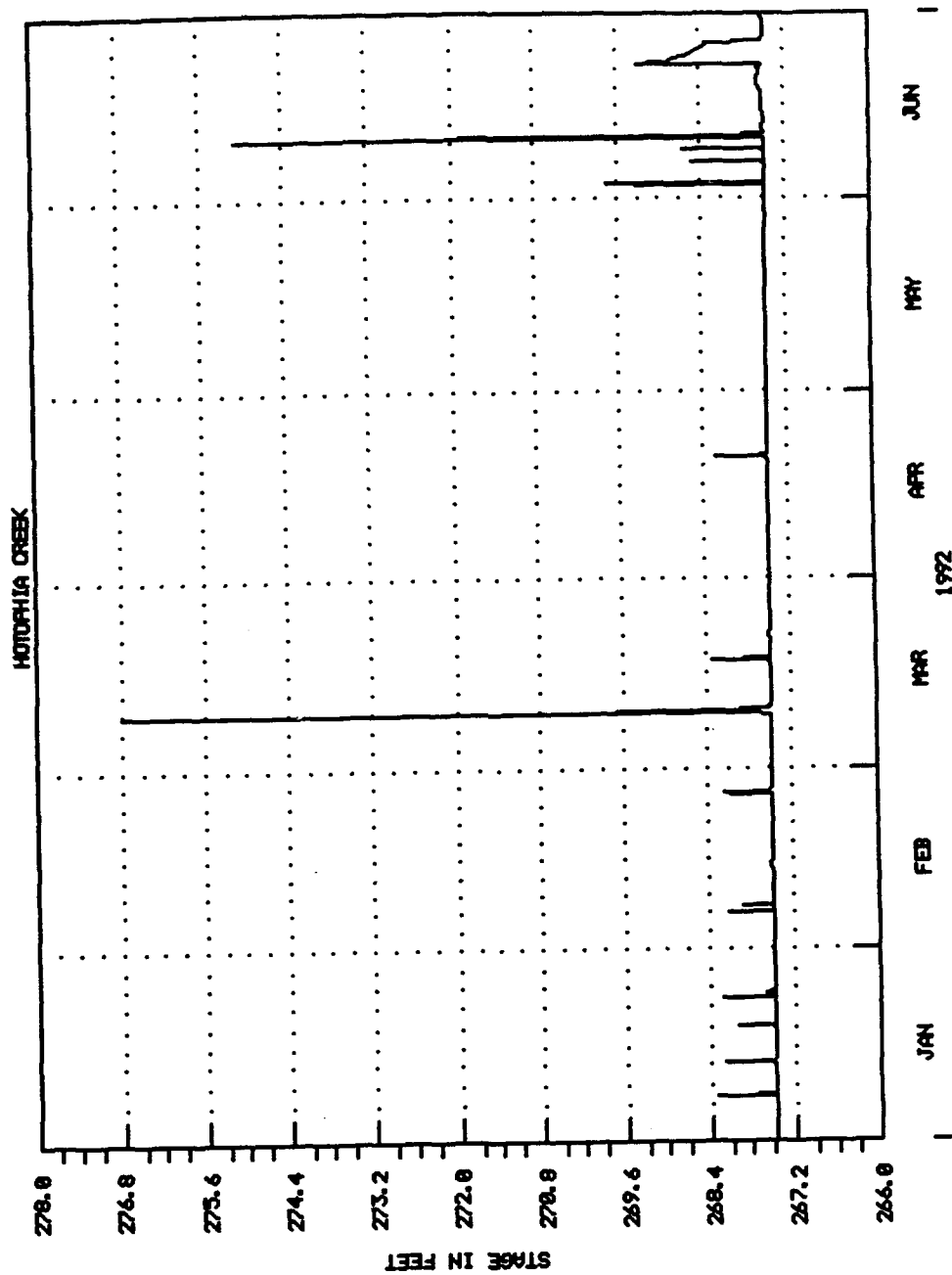
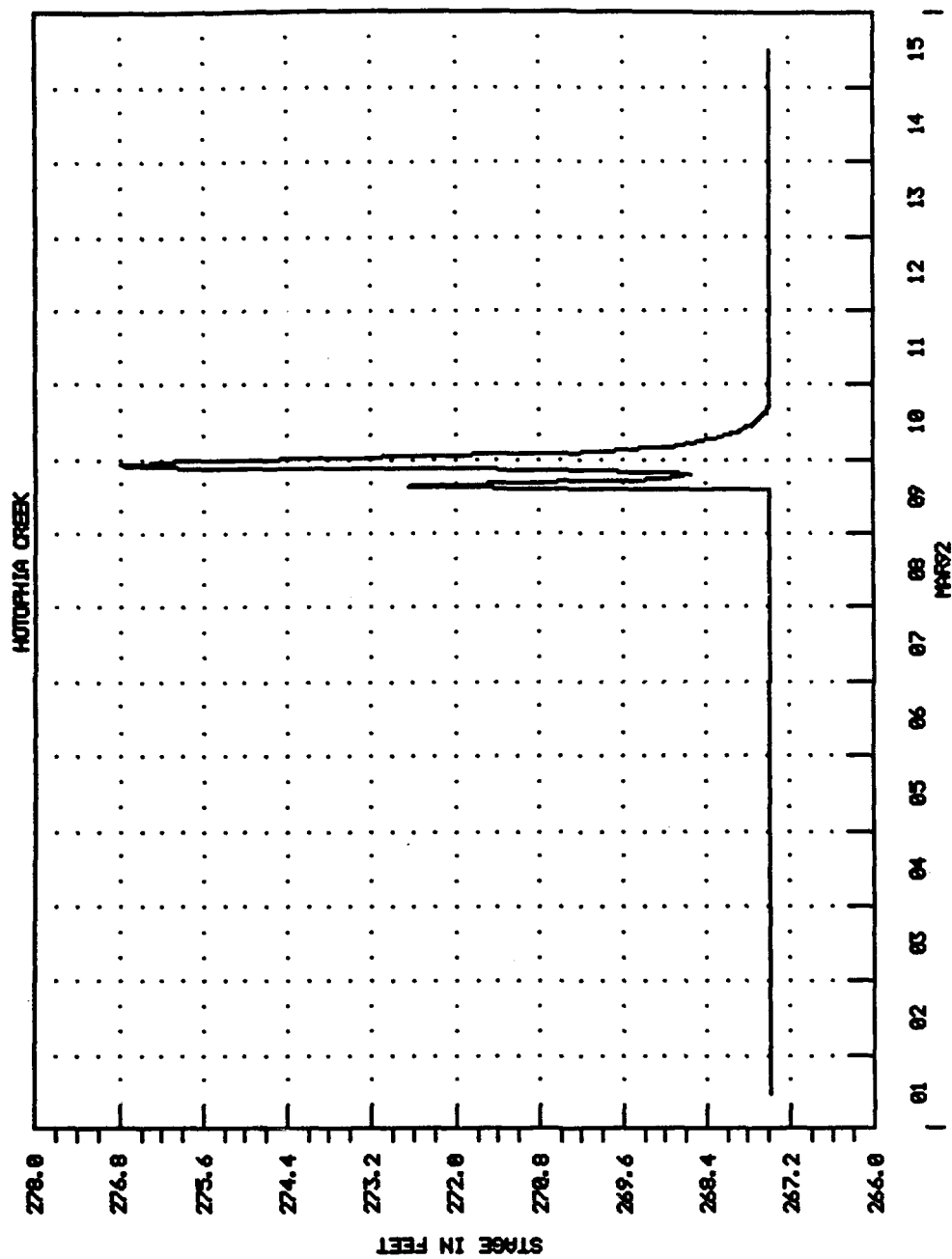


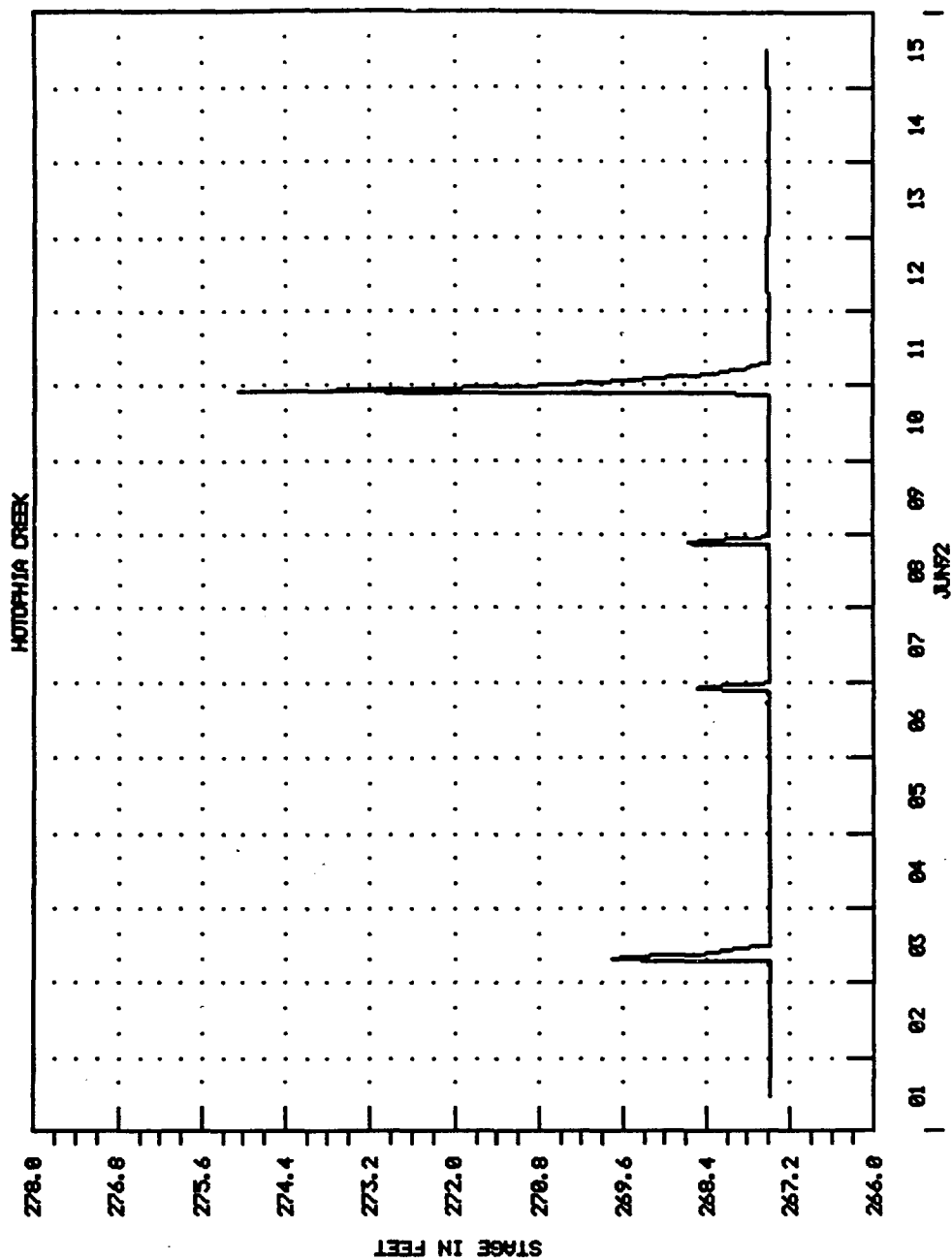
Plate D40



—— PRESSURE SENSOR — GAGE #071340 EVENT DATA (JANUARY-JUNE 1992)



——— PRESSURE SENSOR - GAGE #071340 EVENT DATA (EXPANDED RECORD FOR MARCH 1992)



____ PRESSURE SENSOR - GAGE #071340 EVENT DATA (EXPANDED RECORD FOR JUNE 1992)

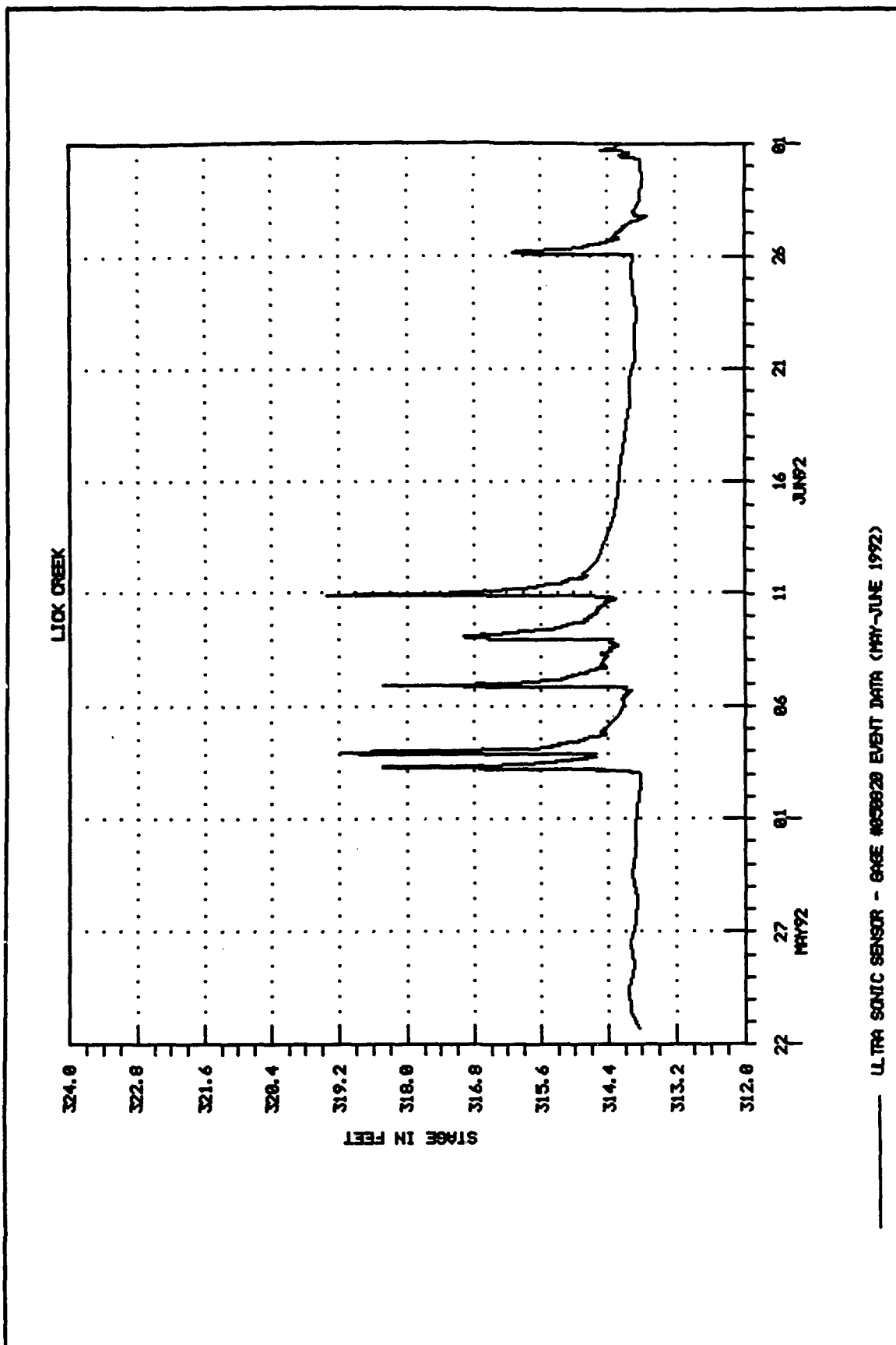
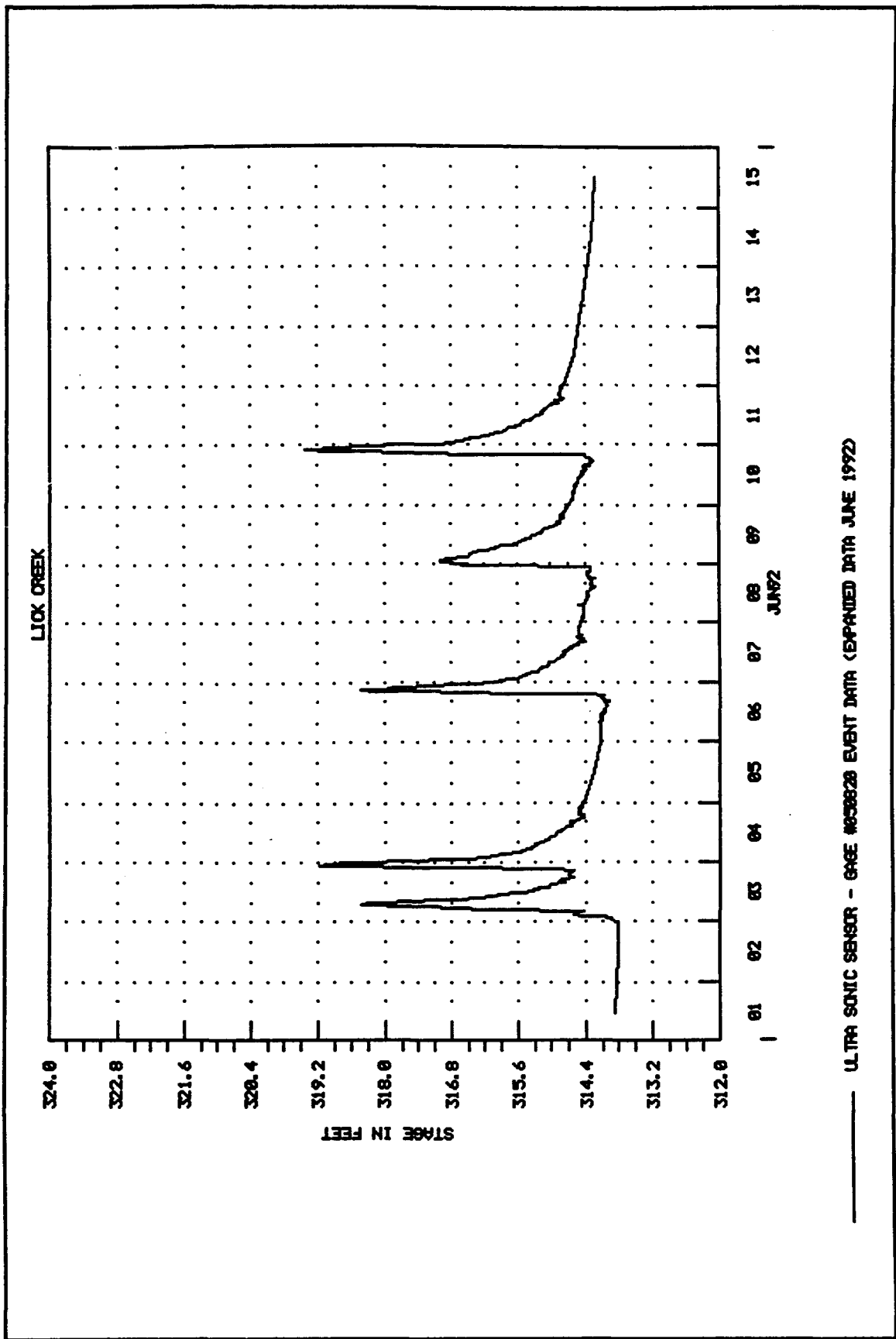


Plate D44



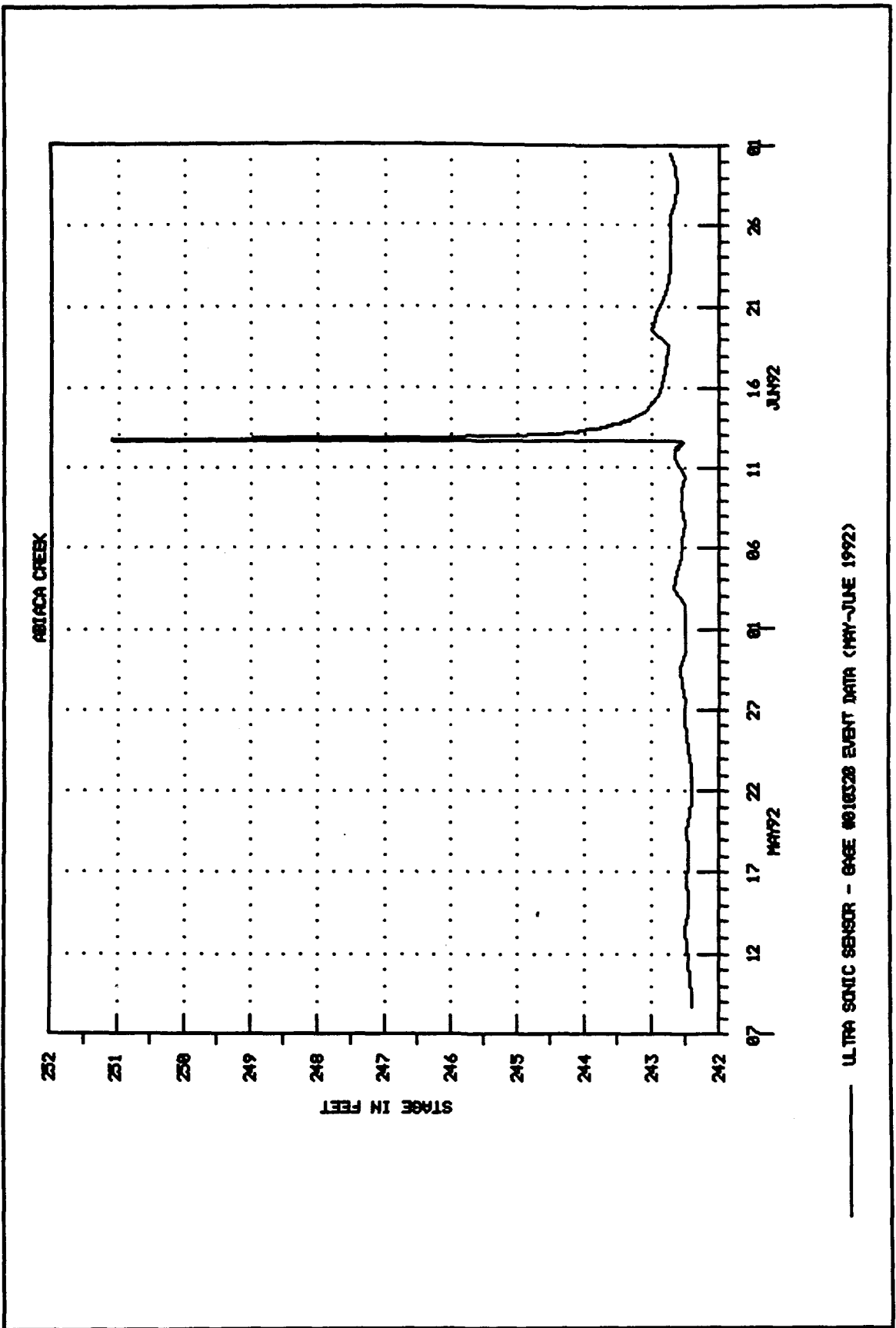
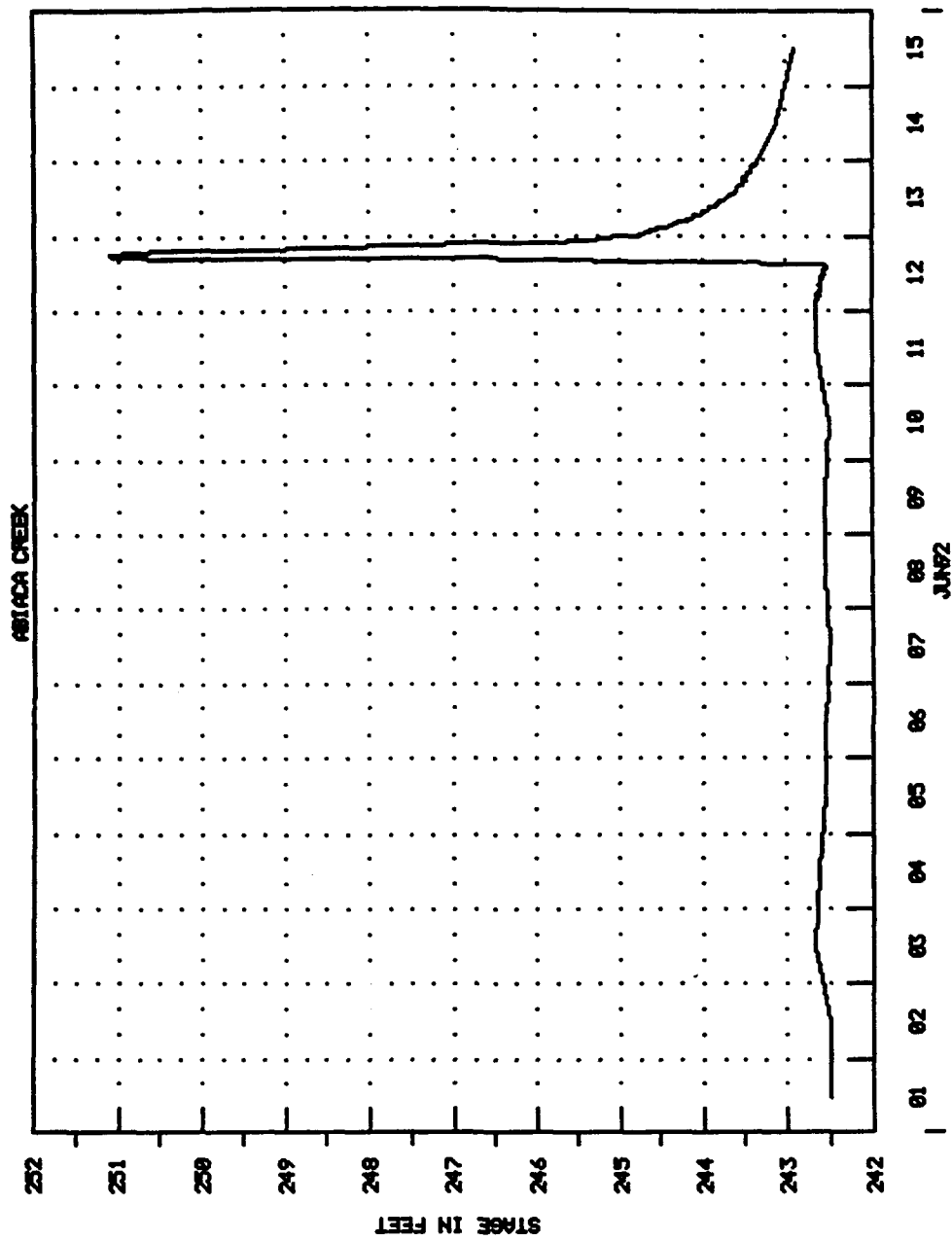


Plate D46



ULTRA SONIC SENSOR - GAGE #016320 EVENT DATA (EXPANDED RECORD JUNE 1992)

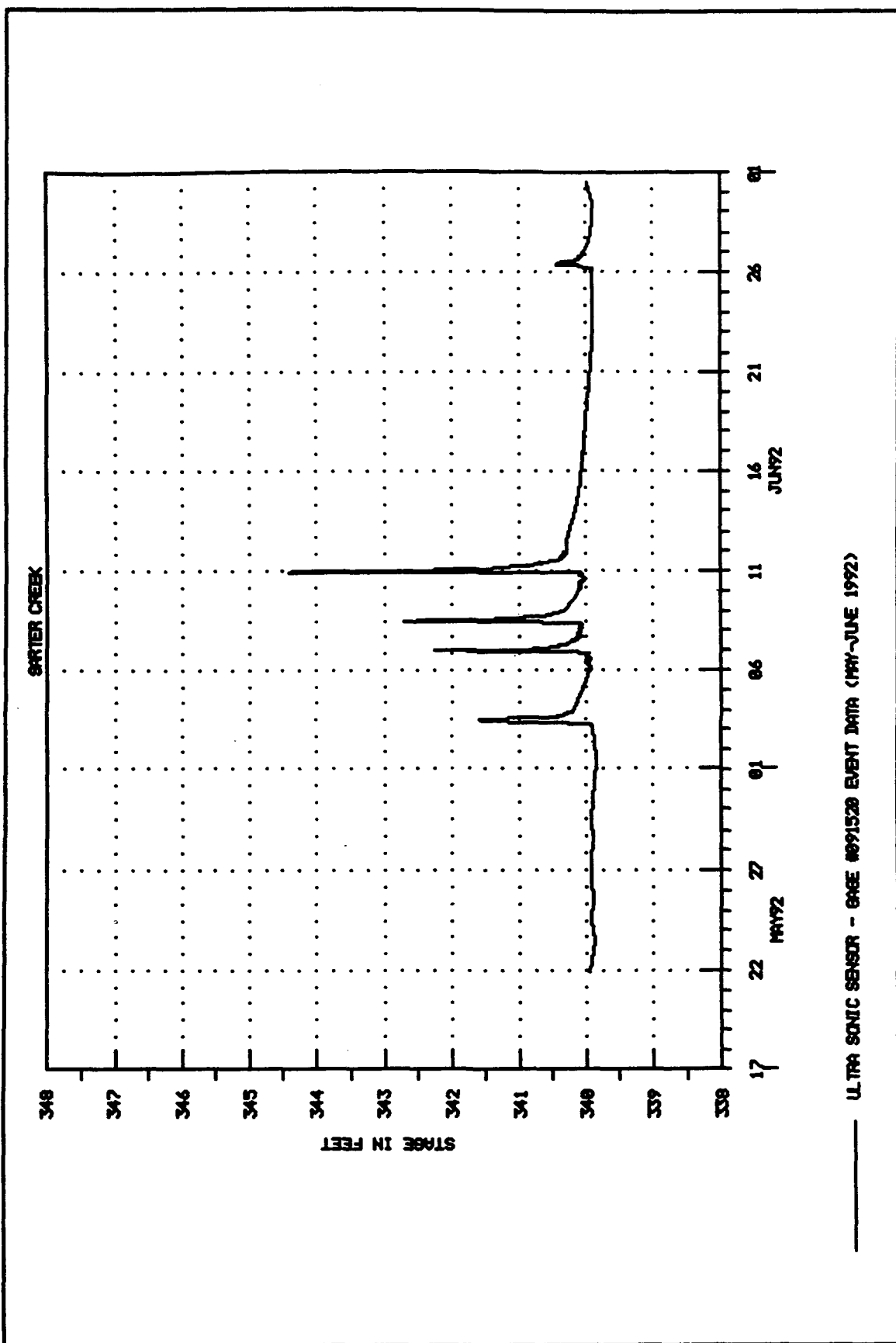
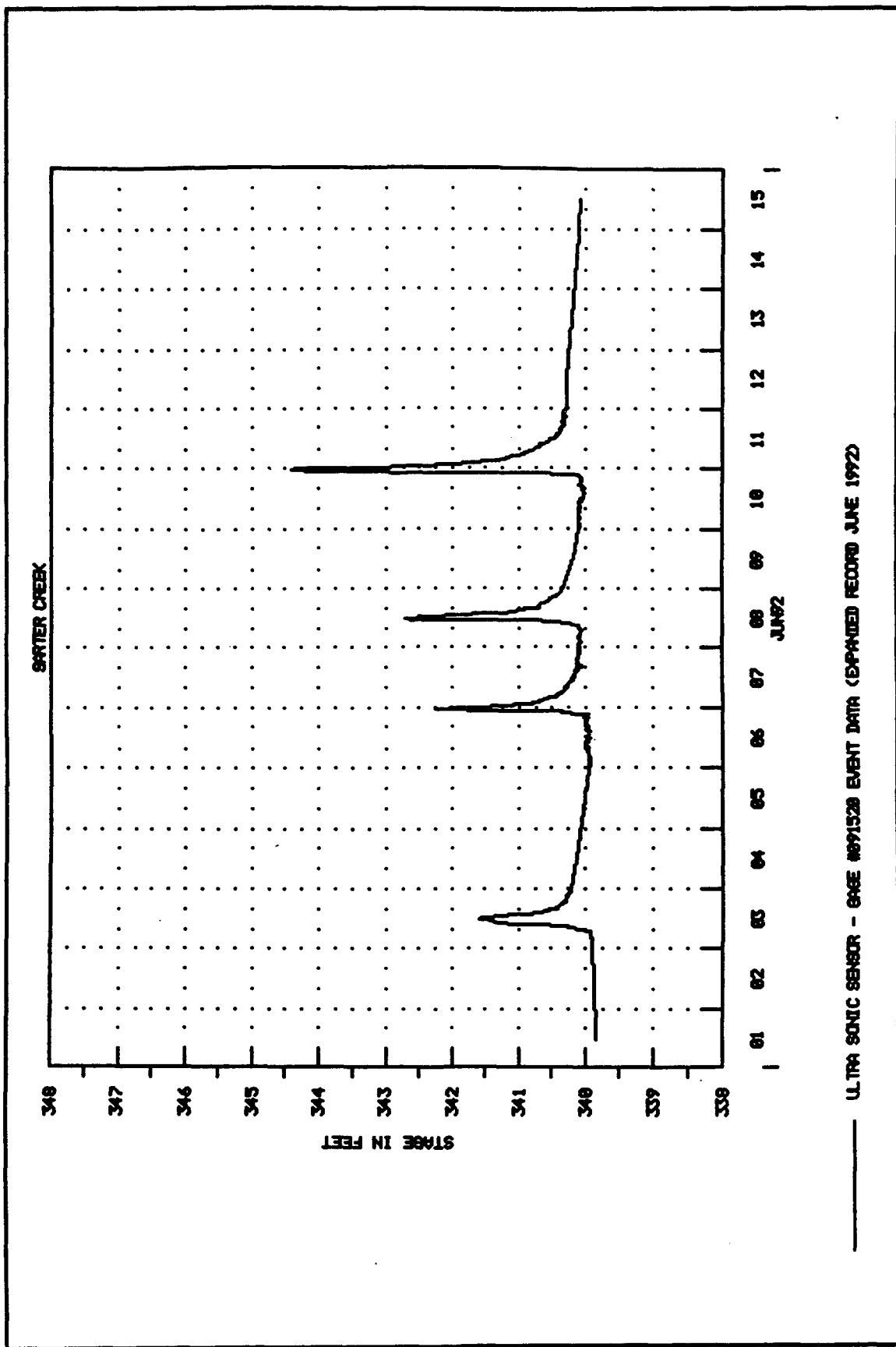


Plate D48



REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.				
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE November 1993	3. REPORT TYPE AND DATES COVERED Final Report		
4. TITLE AND SUBTITLE Demonstration Erosion Control Project Monitoring Program, Fiscal Year 1992 Report; Volume V: Appendix D, Stream Gauging Data Report			5. FUNDING NUMBERS	
6. AUTHOR(S) David D. Abraham, Steve Sutton			8. PERFORMING ORGANIZATION REPORT NUMBER Technical Report HL-93-3	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Engineer Waterways Experiment Station Hydraulics Laboratory 3909 Halls Ferry Road, Vicksburg, MS 39180-6199				
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Engineer District, Vicksburg 3550 I-20 Frontage Road Vicksburg, Mississippi 39180-5191			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The main text and Appendixes A-F were published under separate cover. Copies of this report and the other volumes are available from National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) The purpose of monitoring the Demonstration Erosion Control (DEC) Project is to evaluate and document watershed response to the implemented DEC Project. Documentation of watershed responses to DEC Project features will allow the participating agencies a unique opportunity to determine the effectiveness of existing design guidance for erosion and flood control in small watersheds. The monitoring program includes 11 technical areas: stream gaging, data collection and data management, hydraulic performance of structures, channel response, hydrology, upland watersheds, reservoir sedimentation, environmental aspects, bank stability, design tools, and technology transfer. Appendix D presents stage hydrographs for 16 gauge sites located in seven DEC watersheds (Hickahala-Senatobia, Batupan Bogue, Long, Hotophia, Coldwater, Abiaca, and Otoucalofa). The period of record for each gauge is from the time of installation through June 1992. Also included in Appendix D are specifications for each type of water level sensor and data logger used in the data collection program.				
14. SUBJECT TERMS Abiaca Watershed Batupan Bogue Watershed Coldwater Watershed			15. NUMBER OF PAGES 60	
Hickahala-Senatobia Watershed Hotophia Watershed Long Watershed			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED		18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT	
20. LIMITATION OF ABSTRACT				